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FOOD INDUSTRIES

FEB 6 1942

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

JOBS THAT ONLY A FOOD PLANNING BOARD CAN DO

(*SEE PAGE 33*)

FEBRUARY 1942

Protection Against Bombs and Sabotage

War and the Fats And Oils Supply

What To Do About The Tire Problem

Drying Vegetables

Control of Vitamin Content of Butter

Preventing Spoilage By Mold, Bacteria

How Meat Shrinks

A McGRAW-HILL PUBLICATION

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THE COVER

Yes, there are jobs to be done that only a food planning board can do—jobs that must be done if the food industries of this country are satisfactorily to fulfill their wartime function of feeding not only our civilians and armed forces but 70,000,000 people of the United Nations. These jobs that must be done are discussed in a lead editorial starting on page 33. They involve planning ahead in respect to labor, raw materials, and plant equipment—but turn to page 33 for a complete discussion.

FOOD INDUSTRIES

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This Issue

Spare Those Tires

To a people accustomed to buying automobile tires like they do canned beans—whenever and wherever they want them—OPM's tire restriction order is, to say the least, a rude awakening. And it is much more serious than that to food companies operating house-to-house delivery trucks. It means immediate action to conserve good tires and to rejuvenate old ones. Which is something all food truck operators should do to aid the war economy. What can be done in this respect is told on page 61 in an unsigned article by an authority on truck operations.

Borrow From the Bakers

It would be an unpardonable waste of energy for you to repeat the experiments and research done by the bakers these past many years in developing agents to inhibit spoilage of the finished product by mold and bacteria. So if you are faced with such a spoilage problem, your first move is to turn to page 46 and learn what the bakers know about it. This is told by Elmer F. Glabe, chief chemist, food research division, Stein, Hall Mfg. Co., Chicago.

On Guard!

Damage to food processing plants and to food materials have become definite possibilities since December 7. Air raids may occur and sabotage attempts are almost certain. Food processing plants must guard against such happenings, because it is a war necessity to keep the production of processed foods at a high level to feed the armed forces and civilians of the United Nations.

Effective plant protection requires the setting up of lines of authority and duties within the plant. For a discussion of what these should be, see the article beginning on page 37, which is based upon the latest government publications covering the problem.

Fats and Oils and War

War in the Philippines, and slow and dangerous shipping conditions elsewhere, have definitely reduced imports of vegetable oils and fats into the United States.

Already steps are being taken to increase the imports of substitute materials from Latin America. In addition, American farmers will grow increased crops of oilseeds, including peanuts and soybeans, in 1942. As a result, there should be enough of these materials to meet the demand this year. For details, see the article by Gordon W. McBride, a chemical engineer who is an expert in the vegetable oil fields. Page 57.

Coming

Hell From the Heavens

When Sherman said that war was hell he spoke for the soldier. But time and the ingenuity of man have broadened the scope of his statement. It now applies to civilians, to industry, to everyone. As the British food manufacturers well know, it's a horrible mess when the air raid strikes a plant processing something that is to be eaten by the public. In addition to wreckage and debris, there is broken and pulverized glass which may get onto the finished product or the raw materials, there is the possibility of water contamination, and then there is the threat of poison gas. So in an early issue, FOOD INDUSTRIES will publish some advice by an English technologist, Eric Hardy, on what to do.

A Long Story, But Good

When you start to tell, even concisely, what is known today about dehydrating vegetables, you're going to use a few words before you're finished. FOOD INDUSTRIES started such a story in January, continues it in this issue (page 41) and will have another installment in March giving specific directions for dehydrating various vegetables. The authors are W. V. Cruess and E. M. Mrak, food technologists at the University of California.

The Pause That Refreshes

Consumption of tea, coffee, chocolate and beverages containing caffeine, theobromine and similar alkaloids has been steadily increasing in recent years. In spite of some popular prejudices, there has been general appreciation of the mild stimulation resulting from the use of these foods.

Caffeine and its close relatives are found in many food products. What some of these are and how much alkaloid may be present will be told in a forthcoming issue by Dr. P. W. Punnett, chief chemist of Good Housekeeping Institute, who has made many studies of caffeine- and the theobromine-bearing foods.

Savings That Count

Savings made in one part of the plant are as important as those made in another part. And it is a notable fact that one of the most neglected sources of savings in the food industries is in the economical use of fuel, steam, heat and power. Which adds interest to a story to be published soon in FOOD INDUSTRIES showing how a medium-sized bread bakery saved $1,600 in its annual fuel costs, a sum representing 43 percent of the cost of the equipment installed to effect the saving.

McGraw-Hill Publishing Company, Inc., James H. McGraw, Founder and Honorary Chairman. Publication Office: 99-129 North Broadway, Albany, N. Y., Editorial and Executive Offices: 330 West 42nd Street, New York.

Branch Offices: 520 North Michigan Ave., Chicago; 68 Post St., San Francisco; Aldwych House, Aldwych, London, W.C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta, Ga.

JAMES H. McGRAW, Jr., President; HOWARD EHRLICH, Executive Vice-President; MASON BRITTON, Vice-Chairman; B. R. PUTNAM, Treasurer; DONALD C. McGRAW, Secretary and J. E. BLACKBURN, Jr., Director of Circulation.

A McGRAW-HILL PUBLICATION

Published monthly; price 35c a copy. Allow at least ten days for a change of address. All communications about subscriptions should be addressed to the Director of Circulation, 330 West 42nd Street, New York, N. Y. Subscription rates: United States and possessions, Mexico, Central and South American countries, $3 a year, $4 for two years, $5 for three years. Canada, $3.50 a year; $5 for two years; $6 for three years (payable in Canadian or U. S. funds). Great Britain and British possessions, 30 shillings for one year, 60 shillings for three years. All other countries, $5 a year, $10 for three years. Entered as second-class matter Aug. 17, 1936, at Post Office, Albany, N. Y., under the act of March 3, 1879. Cable address: "McGrawhill, N. Y." Member of A.B.P. Member of A.B.C. Contents indexed monthly in the Industrial Arts Index. Copyright, 1942 by McGraw-Hill Publishing Company, Inc.

FOOD INDUSTRIES

FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

LAURENCE V. BURTON, Editor

FEBRUARY, 1942

Jobs That Only A Planning Board Can Do

WHEN everyone is aware of the character of the jobs that must be done by the much needed overall food planning board there is reason to believe that all concerned will encourage its formation. This need for such a planning function exists because there has been a huge gap between the functions of OPM and the U. S. Department of Agriculture. Unless this gap is bridged, unless this No-Man's Land between control over equipment and supplies by WPB and control over production of the raw foodstuffs by the Department of Agriculture is occupied at once by a suitable planning board, the United States and some of the United Nations will face grave food problems in 1943 or 1944.

If the President's speech on the state of the nation on January 6 has not aroused forward thinking on the part of everybody, then we are in a bad way indeed. You have to realize that the armament program as stated is only the more spectacular part of the job. With an army of 8,000,000 contemplated and with the President's armament program to be fulfilled, there's going to be an acute shortage of labor—in fact, a labor shortage already is upon us. Not only that, but there's a shortage of materials, the like of which has never been known before. Yet these scarce materials and plans for their use are needed to help bridge that gap between WPB and USDA. (The new War Production Board already supplants OPM.)

Gap To Be Bridged

What is this gap? This gap is the wherewithal to take perishable raw materials, process and package them into a form in which they will not spoil, and thus make them available for everybody, including the armed forces, at any season in the year. If WPB directs nearly all the available materials to armament building while at the same time the Department of Agriculture orders huge increases in crops and livestock production, where, pray, are the food processors going to get the facilities with which to preserve all this food in 1943? By 1943 we shall begin to run low on many important supplies, mainly packaging supplies. It is important to remember that the demand for food is not merely for the 130,000,000 people of the United States, but also for about 70,000,000 more people in the United Nations outside our borders.

Demand is up about 35 percent, whereas some packaging supplies are down more than 75 percent. These supplies are indispensable for the preservation of foods by customary methods. There is enough on hand for 1942, but 1943 poses some huge problems. To have the solutions ready by 1943 requires that we must start now—in 1942. When January 1943 comes around it will be too late to get ready for the 1943 summer crops.

Some of the Problems

To merely hint at some of the problems, consider this: If dehydration must be expanded hugely to compensate for the inadequacy of the supply of certain metals used in packaging, then enough steel to construct a warship must be converted into a minimum of about 500 steam boilers. Or, if freezing is the alternative process, then construction must start immediately on a large number of huge cold storage warehouses, ammonia compressors and freezing machines.

How many boilers, warehouses, dehydrators or freezing machines is but a small aspect of the problem. Where are they to be placed? Who is to pay for them? Yes, who is to order them or operate them? These are but a few of the planning jobs.

OPM has not taken the initiative. But how is the food industry to take the initiative with restrictions and price controls on every side?

Are we, an intelligent people, going to blunder haphazardly on food preservation?

Here is another matter for the handling of which there exists no adequate machinery. Glass containers of both narrow- and wide-mouth types offer a planning problem. In theory one should order his bottles now for use next

summer and fall, but to do so one must specify the particular style of neck finish wanted: Crown, White, Alseco, Anchor, Phenix and the like. One must also order the corresponding proper closures. If the closure requires a cork liner, the WPB will not permit you to have on hand more than a 30-day supply. In these days you can have no guarantee that you will get the closures. So you might find you had a year's supply of bottles on hand and couldn't get the closures to fit. The net result of all this is that most concerns are reluctant to order their glass until they can receive simultaneous delivery of the right closures. With the glass-container industry operating at approximate capacity there is not sufficient flexibility to guarantee deliveries of delayed orders on time. This constitutes another instance of a need to bridge the gap between WPB and the Department of Agriculture, lest raw food be allowed to rot.

Planning Board Imperative

It is imperative that some adequate board or committee be created that will have the initiative and the power to make the necessary plans and put them into effect. OPM has lacked the power to act; it merely controlled action—somebody's else action. If that somebody did not act there was nothing to control. AAA has the power to act to get the farmers to produce more or less crops. SMA has the power to act by buying or contracting to buy processed foods for the stamp plan and for Lease-Lend exports. But under the old set-up there was no one to act for the civil population which must depend on processed foods out of season. Army and Navy buy for themselves, not for the civil public.

Under the old set-up there was an unconscious dependence on muddling through on production of a strategic material—food.

Food preservation must be planned for under today's conditions, just as much as all those planes, guns, tanks and ships.

K V Burton

EDITOR

The Talk of the Industry

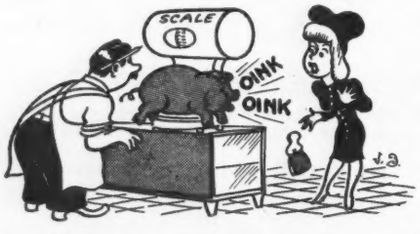
● When the United States produces and fights as good a war as the President promises, it will be quite an affair.

● Subscribers to FOOD INDUSTRIES who have saved all their back copies have a mine of useful information that will be valuable in the days to come.

In each December number is an index of the preceding 12 issues. Use it. Look up your own information in your own back issues.

A serious publication deserves permanent binding for your personal or your company library where it can be consulted readily, whether it be FOOD INDUSTRIES or any other technical journal.

● Secretary of Agriculture, Claude R. Wickard, is the only person in Washington who is apprehensive over the ability of food processors to preserve all the foodstuffs to be produced in



1942. Pointing out that a 28 percent increase in number of hogs will be marketed this fall as compared to the Fall of 1941, he is fearful lest the meat packers cannot meet the needs of the situation. It is not enough to kill and dress the animals; something must be done to preserve the meat for an indefinite period. It will be much easier, he says, to grow the food than to preserve it. His fears are not confined to hogs but extend to every perishable food. Of all official Washington, he alone has exhibited any grasp of the magnitude of the food preservation problems ahead. Old timers says he is turning the Department of Agriculture upside down in his effort to stimulate quick action.

● Washington is fully aware that many a manufacturer throughout all industry has tried to put one over by acquiring scarce materials and partially manufacturing them to the point where they are of no value for any other use, thereby hoping to keep their businesses going despite priority problems. Such inventories often run to more than $1,000,000—some are reported to run into eight figures. These inventories are said to be the "largest metal mines" that are now available. A crackdown is being prepared, but it won't help anyone very much except those actually engaged on war contracts.

● Now that the manufacture of passenger cars for civil use has been stopped, many a salesman has wondered just how much longer he can continue to get around to his trade.

Ditto for employees, farmers and everyone who needs a car in his business.

Prediction: Many a person will put in his order, backed by a cash deposit, for a new car as soon as automobiles can again be manufactured, just as it occurred at the end of the last war. He will thus have an option on a new car—a sort of place in the waiting line—and his option will be worth real money. In 1919 an option for prompt delivery of a Model T Ford was alone worth $50. And you couldn't buy a car except in the place where you lived.

Soon a lot of us will learn to walk again, which will increase food consumption. The bakers and flour millers ought to benefit materially.

● Manufacturers who seek adequate priority ratings for food equipment purchases should be aware of the existence of a host of unidentified committees in the Department of Agri-

culture. These have a very important influence on the priority ratings granted. WPB refers a request to one of these committees in USDA and, in theory, accepts the committee's recommendation on the urgency of the need. In actual practice, however, WPB does not always concur in USDA rulings. And comparable requests apparently do not always go to the same USDA committee, which may account for some strange discrepancies in priority ratings on identical requests from the same firm.

● Let those who bemoan the cost of the war consider the cost of defeat. Nothing is so costly as a military failure. The real expense only begins when a nation signs on the dotted line that document known as a petition for an armistice.

● Selection of Donald M. Nelson as head of the War Production Board to replace the previous buck-passing setup has everybody's approval. Perhaps the new board will ultimately get around to food preservation. Anyhow it cannot dodge the issue.

Your Part in the Draft

Management should not expect the impossible by hoping to secure successive postponements of the draft of its eligible employees into the armed services. The law is clear and specific. A huge army numbering many millions, perhaps between five and ten millions, is to be created at an ever-accelerated pace.

Wise management will utilize the fleeting weeks to formulate a plan to replace "indispensable" men. Training of factory replacements should begin at once.

Local draft boards are reasonable, provided you, too, are reasonable. But to be convincingly reasonable to a local board, you must have your own replacement plans already in action.

Don't forget that the United States is engaged in a two-front war. And there is no fooling this time.

SMA Food Purchases—Huge and Surprising

A review of SMA purchasing of foods principally for Lease-Lend between its start, March 15, and November 30, 1941, shows some surprising items as well as quantities. Lard, 308 million pounds; canned pork meat products, 209 million pounds; cured and frozen pork meat products, 231 million pounds are only a starter.

There are also items such as cheese, 137 million pounds; dry skim milk, 32 million pounds; evaporated milk, 13 million cases; dried eggs, 35 million pounds; frozen eggs, 66 million pounds. Then there are about 6 million cases of canned vegetables and almost 200 million pounds of dried beans, to mention some of the larger items.

Of the item labeled "dehydrated onions," SMA has bought 319,000 pounds.

Concentrated orange juice, 198,002 gal., concentrated lemon juice, 30,000 gal., and dried apples, 9 million pounds, are interesting items, but dried apple pomace 1¾ million pounds is surprising indeed. Then comes another huge item, corn starch, 169 million pounds.

Among the miscellaneous items one finds 2½ million cases of canned pork and beans; 3½ million pounds of canned ration; 4¾ million pounds of dehydrated soup; more than 9 million pounds of corn sugar; 15½ million pounds of soya flour and 21 million pounds of soybeans.

Pectin to the extent of 1½ million pounds has been purchased, as well as 462 tons of chicory root and 26,320 pounds of enzymes.

No wonder vitamin A is growing scarce, for SMA took 106,942 pounds of fish liver oils, or 3,527,104,000 units. (We have been advised that the government release is in error, that it should be 3½ trillion units.) Thiamin hydrochloride to the extent of about 19,000 pounds must have gone to Britain, as well as about 11,000 pounds of vitamin C, but no riboflavin is mentioned.

The foregoing are but a few of the more spectacular food items, the total cost of which is more than $400,000,000. Total SMA purchases, including non-food items like cotton and Naval stores, ran to more than $500,000,000. Uncle Sam is verily a big buyer, but

Hors d'Oeuvres

• *The people of Japan, says Dr. James A. Tobey, subsist on a diet deficient in vitamins. Yes, they are a scurvy lot.*

• Under the Wage and Hour Law, factory workers need not be paid for nonproductive time spent on the employer's premises during an air raid or blackout. So all the employer stands to lose is his factory and his life.

• *"Vegetables, Vitality and Victory" is the slogan for the national garden program. If you participate in this program, be careful. When you spade up the dirt, those things that wiggle may be Japs in disguise.*

• Sailors in the U. S. Navy call soft drinks "gedunk." Though what they call a drink matters little so long as they don't do bottoms-up.

• *A valuable diamond recently was shipped in a tin can to a jeweler in Valdosta, Ga. And in a year or two they may be shipping tin cans in jewel boxes.*

• Hens need 13 hours of light a day for maximum egg production, and electric lights lengthen the day in the henhouse. Therefore, say poultrymen, a general blackout would reduce egg production. But then, our civilian defense program has laid quite a few eggs.

• *Chloropicrin, an agent used in poison gas, helps to increase crop yields if used as as soil fumigant. So poison gas may solve humanity's food problem two ways—by increasing the supply and decreasing the demand.*

• A train of 12,000 refrigerator cars, about 94 miles long, would have been required to haul the eggs produced in Wisconsin during the first 11 months of 1941. And if the eggs had been hauled in nonrefrigerated cars, it would have been a rotten shame.

• *A wafer made with sauerkraut, salt, sugar, flour, lard and cream has been patented. The Germans would go for this—if they had the lard, the cream, the sugar and the flour. And if they had some ham they'd have ham and eggs, if they had some eggs.*

• Garlic is being added to dogfood. Up to now man's best friend has been his dog.

• *Someone has gone and put spinach into bread to enrich it. Fresh spinach is added to the dough batch. Next thing, somebody will be retailing family-size bales of hay.*

• Americans are warned that they can look forward to living in a smaller house, eating one instead of two eggs for breakfast, wearing mended clothes and playing parlor games for amusement. But a small house is easy to heat, one egg is plenty for breakfast, mended clothes are o.k. if others wear them, and parlor games can be quite interesting.

F. K. L.

remember these are not for the Army and Navy, but for Lease-Lend and a few domestic uses.

Self-sabotage Restricts Supplies of Sugar

In time of war it should be enough of a job for the people of the United States to wage a victorious campaign against their enemies. Unfortunately, some people do not seem to have that thought clearly in mind. By their thoughless actions they make it more difficult for manufacturers to maintain the needed output of products and for consumers to maintain their standard of living. Hoarding of food materials is a prevalent and serious example of such unfortunate actions.

Consider the sugar situation, for example. In 1940, deliveries of sugar for consumption by manufacturers and the public reached a total of 6,890,000 short tons, the largest figure then on record. Undoubtedly, this consumption figure already contained some hoarded sugar, for many housewives and others showed their fear of sugar shortage as early as September, 1939.

In 1941, apparent consumption of sugar jumped to an estimated 7,900,000 short tons, over a million tons in excess of the already inflated 1940 figure. Although there was an increase in actual sugar use during 1941 as compared to previous years, various authorities in the sugar field are agreed that at least 1,000,000 tons of sugar was hoarded last year.

Much of this sugar went onto the pantry shelf and is, to all purposes, irrecoverable until such time as the housewife chooses to put it into use. But the larger part went into the warehouses and storerooms of food processors and wholesalers. This the government can force the hoarders to disgorge, as will be done.

Because of this unwise hoarding by a few, all will now have to suffer the inconveniences of sugar rationing. And this, in spite of the fact that there is no immediate prospect of a sugar shortage. To prevent further overbuying, the government has had to restrict movements of sugar into consumption during 1942 to, in general, the quantities purchased for delivery for consumption for the corresponding months of 1940.

Although the recently published indexes of inventories of durable and nondurable goods, compiled by the National Industrial Conference Board, do not look too promising, it is hoped that this drastic action on sugar will prevent other instances of the senseless hoarding of plentiful food supplies.

Things You Should Know About Refrigeration

There is no satisfactory substitute for competent engineering service in the design of food processing plants —or anything else, for that matter. Since preservation of food by freezing seems destined to considerable expansion in the near future for strategic defence reasons, it is well to emphasize the need for sound engineering.

Few people, unhappily, comprehend the true function of the consulting engineer. His proper function is to carry out what you as a manufacturer want done, but too often the food manufacturer does not know in exact technical terms what he wants done and frequently has to depend on the refrigerating engineer for the "why" as well as the "how."

In this day of scarcity of metals and equipment there are bound to arise many instances where a compromise between technical needs and available equipment will be necessary. Already the editors of Food Industries have seen storage rooms insufficiently insulated because of the 1941 cork shortage.

While it is true that additional refrigerating capacity can compensate for lack of adequate heat insulation, it must be remembered always that this is not the whole story, for room temperature alone is not the sole criterion of good freezer storage conditions. Equally important is the matter of uniformity of temperature throughout the room, for moisture will evaporate from the warmest part of a freezer room and migrate to the coldest. The coldest place is the refrigerating coils.

When frozen foods are stored there is always this tendency for moisture to escape unless it is prevented by proper packaging, yet even then either temperature fluctuations or differentials of temperature between the interior parts of a perfect package will result in drying out that will cause irreparable damage to the food. This is true even when the moisture leaves the food and freezes onto the inside of its package, for the food is just as much dehydrated as if the water had frozen on to the refrigerating coils at a distance of many feet.

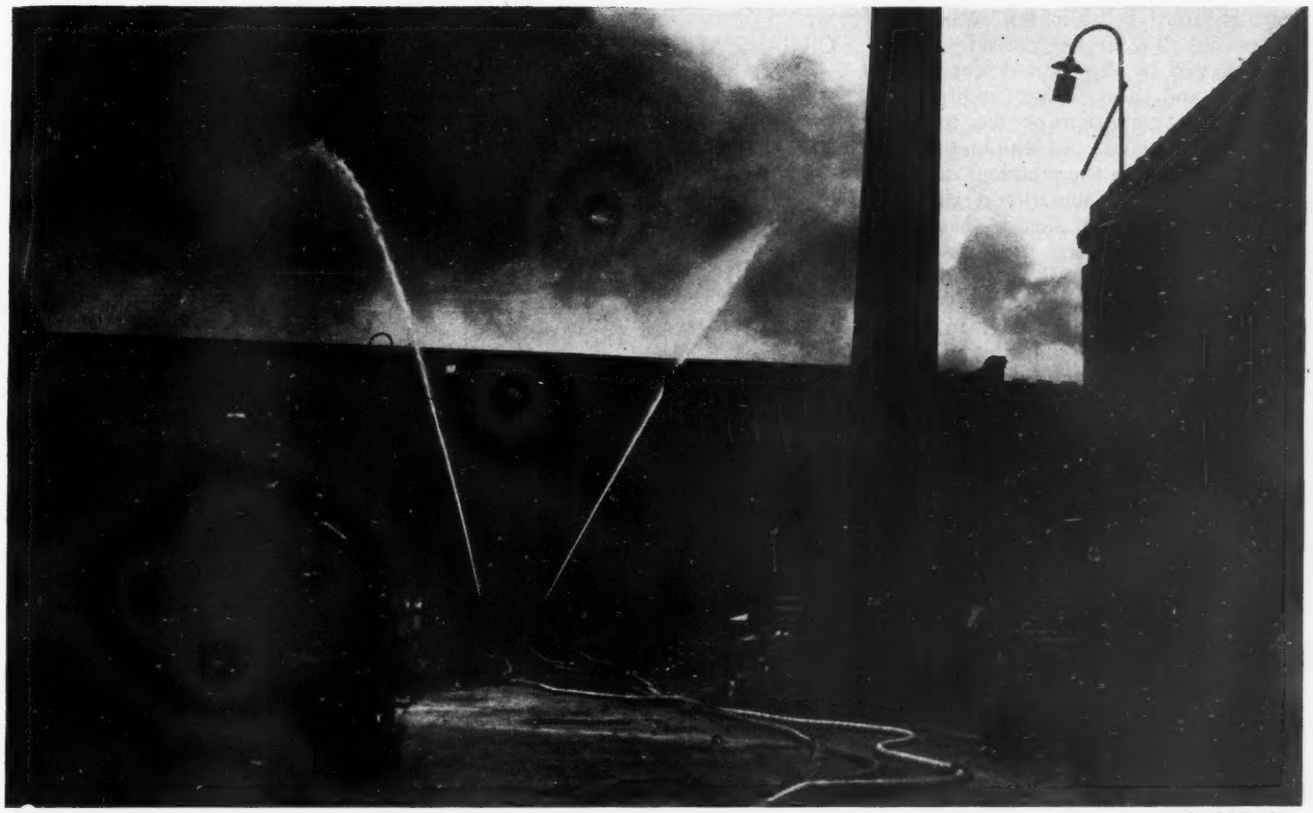
Manufacturers who lack an understanding of these principles may be tempted to install refrigeration equipment on the basis of price rather than its adequacy to perform the job they want done. They may be tempted to accept a plan that is less expensive because it has insufficient insulation or a lesser area of heat absorption (the refrigerating coils) without realizing that operating a smaller coil surface at a lower temperature may ultimately result in damage to the food in storage despite the fact that approximately equal average room temperatures can be maintained by the expenditure of a little more power for compressor operation. The desire to economize on coil areas may also be accentuated by the difficulty of obtaining the necessary metal with which to fabricate the coils.

A safe rule to follow is to insist on a practical minimum of temperature differential (or split) between the temperature of the refrigerant in the coils and the desired temperature in the storage space. Such a practical minimum split is 4 deg. F., and to obtain this result it is necessary to have an adequate coil area, usually not less than 6 or 8 ft. of coil length per cubic foot of refrigerated storage space. But this ratio is predicated on adequate room insulation. If the latter is not adequate, the split will be increased and nothing can prevent it.

If urgent necessity should ever compel the adoption of inadequate insulation or too small coil surfaces and a consequent higher temperature split, then this should be done with full realization of the inevitable consequences. Plans should be made to reinsulate the room or to enlarge the coil area as soon as possible. Also, every effort should be expended to minimize the ravages of dehydration in storage by adequate packaging *without air voids in the packages.*

Any good refrigerating engineer can create the temperature conditions you need, but he may not always be informed of the principles of food technology.

If neither you nor the engineer is aware of the potential hazards of compromise with proper conditions, you may blunder into a very costly operation.



British Combine

When bombs fell and set fire to this English food warehouse it was too late to institute protective measures. Fortunately, the English were prepared.

PROTECT YOUR PLANT FROM BOMBS AND SABOTAGE

Responsibility for measures necessary to protect the food plant, its personnel and its products, from bombing and sabotage, rests with the plant management, which should cooperate in this effort with the local civilian defense authorities and the FBI. This article outlines, in general terms, the steps that should be taken.

IT is the duty of all food manufacturers to plan for the protection of their workers, their plants and other physical property during the war. The Office of Civilian Defense exists to supervise the general protection of the public and to advise the individual industrial plant as to the measures it should take to protect life and property during air raids. In a similar way, the Federal Bureau of Investigations has general oversight of measures to protect against sabotage. But responsibility lies with the individual plant management to organize the employees and equip the plant so that loss of life or damage will be prevented or minimized and interruptions to production avoided.

No food manufacturer should assume that "It Can't Happen Here" and neglect this duty. Instead, he should immediately consult the representatives of the Office of Civilian Defense in his locality and organize to give his plant the degree of protection that they regard as necessary. Bombs and saboteurs strike without warning, as we should all realize after Pearl Harbor.

While it is not likely, at least for the present, that American cities will undergo the repeated, large-scale air raids to which British cities were subjected in 1940 and 1941, sporadic raids are very definitely possible at any time. And such raids threaten not only the coastal areas of the country, but may occur hundreds of miles inland.

Authoritative bulletins, telling what should be done, are available through the Office of Civilian Defense. Among these are:

1. Blackouts, prepared by the War Department, for sale by the Superintendent of Documents, Washington, D. C., 25 cents.

2. Civilian Defense—Protective Construction, Structure Series, Bulletin No. 1, for sale by the Superintendent of Documents, Washington, D. C., 25 cents.

3. Protection of Industrial Plants and Public Buildings. Superintendent of Documents, Washington, D. C., free.

Protection Head Necessary

The first step that should be taken by any food manufacturing plant in setting up its system of plant protection is to delegate the responsibility for the system definitely to one

man. He must be given full authority to carry out all protective measures that are requested by the local defense authorities and also those additional measures that conditions peculiar to the plant may demand. All employees of the company, from the president down, must be made to understand clearly that this "defense coordinator" has full authority in all matters pertaining to plant protection. He also must have authority to maintain contact with local officials of the Office of Civilian Defense, the local police and fire authorities and all other appropriate governmental agencies.

During actual raids, the defense coordinator should have complete charge of all activities within the plant.

Naturally, since the plant defense coordinator is charged with so much responsibility, he should be selected with extreme care. He should be a good executive, clear thinking and quick to act. And he should not be so encumbered with other duties that he does not have the necessary time to devote to the organization and training of personnel to carry out defense measures.

Organizing for Plant Protection

In the accompanying chart is shown the outline of a complete protective organization for a large plant. Naturally, the small or middle-size plant cannot build so complete an organization, but study of the various services shown on the chart will indicate what activities need to be provided for and also suggest how these can be combined in the smaller plants.

As indicated in the chart, the necessary protective services fall into four groups: Police, fire, health and plant maintenance. All of these services should be provided for, and a varying amount of personnel, depending on the size of the plant, should be trained as quickly as possible to carry out the various functions. Note that these services fall into two categories: (1) Those necessary to prepare the plant to carry on should a raid occur, and to guard against sabotage or other enemy action; (2) those necessary to protect life and maintain production during and after actual raids.

Functions of Defense Coordinator

The defense coordinator's first duties should be to determine what is the likelihood of the plant being bombed, and what are the kinds of bombs likely to be used, their effects, and the precautions to take against them. He should then select the men who are to head up each of the four groups of services—fire, police, medical and maintenance.

It is then the responsibility of the defense coordinator to prepare plans for plant protection and to oversee the organization, equipping and training of the personnel that is to carry out the protective measures. He should also organize his office to provide communication with the civil air raid warning system, to maintain liaison with local defense authorities and to control intra-plant transportation facilities, if any. Also, if the plant is of any size, a plant communication and messenger service should be set up to operate in emergencies.

A "report center" under the plant defense coordinator should receive regular, periodic reports from each key man or squad in the protective organization, so that the defense coordinator may know when his plant is fully "manned and ready." This office should also develop check lists of all necessary equipment, structural changes, and so forth, so that a record is always available of the status of protective measures in the plant.

In training the force to carry out their duties, in the large plants at least, squads should be organized to render each particular service. Of course, in the small plant a single individual may suffice in place of a squad. However, provision should be made in the small plant for all aspects of plant protection. As far as possible, individuals should be assigned to the type of protective service for which they are best suited by previous training and experience.

The training of personnel should provide first for the training of individuals, then of squads. Thereafter, the entire organization should be trained collectively to insure the fullest degree of teamwork, cooperation and usefulness.

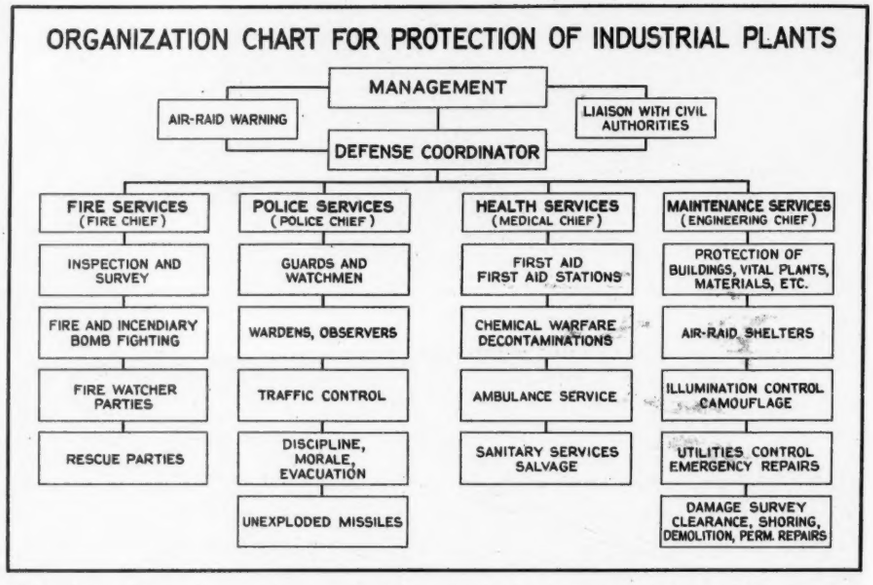
The plant police chief should be in charge of all guards and watchmen, of the work of air-raid wardens and aircraft observers, and of training in gas defense and the wearing of protective devices.

Prevention of sabotage is one of the most important of the police services. The police chief should supervise all guards and watchmen. He should be responsible for all persons entering the plant area. And he should safeguard the plant, its materials and products from all subversive activities. In this work he should cooperate with the agents of the FBI, and carry out their suggestions for protection against sabotage.

In the food plant, sabotage prevention is in part a technical activity. It is just as necessary to protect the raw materials and finished foods from sabotage by adulteration or contamination as it is to protect the plant machinery and buildings. Therefore, *the police chief should have the collaboration of the plant laboratory, or of trained technical men, in establishing a protective routine to assure the wholesomeness of all food materials entering or leaving the plant.*

Under the police chief there should be a senior air raid warden in charge of all wardens and aircraft spotters. Persons serving as wardens must be calm individuals with presence of mind who can act as advisers and guides to other employees. The wardens should be trained to work with the local air raid warning system. They will observe where bombs fall and fires break out. Observers should be placed at points in the plant where they can view all surrounding buildings and areas. They must report the approach of planes, bombs dropping, fires or any other unusual incidents to the senior air raid warden.

Wardens must be prepared to handle



This chart shows the services needed in any food plant to protect it from wartime damage, to safeguard its personnel and to avoid loss of production. The outline was developed by the Office of Civilian Defense.

British Combine

Decontamination practice, showing the cleaning of food products contaminated with mustard gas.

the evacuation of employees to air raid shelters or other places of safety when need arises. By means of air raid drills, each employee should be trained to go from his working station to the shelter by the most direct route—without confusion, undue haste or loss of time.

Wardens are also responsible for seeing that all lights are extinguished during a blackout except those permitted for safety or other reasons.

Additional functions of the police services should include control of all traffic in the plant and maintenance of clear routes during an incident for the passage of necessary automobiles, rescue trucks, repair trucks and ambulances. The handling of unexploded missiles is a responsibility of the police services, and the men attached to these services should be given special training for this work.

Fire Protection

A plant fire chief should be appointed to head the plant fire-fighting services. He will be responsible for the fire-fighting squad and for the nceessary equipment, both permanently installed and temporary. His first activity should be to survey the plant and plan for immediate precautionary measures, such as removal of old equipment and rubbish from roof spaces and other locations. Access to the roof should be provided. The adequacy and availability of water supply, both main and auxiliary, should be determined and additional or emergency supplies provided for if need is indicated. All men assigned to the fire-fighting squads should be taught methods of fighting fires and dealing with incendiary bombs.

Fire-watcher squads should be organized, equipped and trained. Their duties are to watch for, locate and handle incendiary bombs so as to prevent a small flame from becoming a conflagration.

Rescue squads should be organized and trained to rescue people from damaged buildings. Their duties may be extended to include emergency handling of utility services. They must be able to cooperate in their work by means of hand signals. They must be trained in first aid. They must be capable of acting directly and quickly.

Fire posts, equipped with necessary fire-fighting equipment, should be conveniently situated, but dispersed and decentralized. A direct communications system between fire-watcher posts, fire posts, fire squads and the headquarters of the plant fire chief should be provided, so that reports of fire may be made and assistance may be sent when necessary.

Medical Services

Plant medical services should be under the plant physician or a local practising physician who, in addition to his regular training, should know how to handle poison gas cases. This medical chief should organize a first aid service and train employees in first aid measures. As far as possible, all employees should have first aid training.

Conveniently situated first aid stations, in charge of trained workers, should be located throughout the plant area, as needed. These stations should be amply protected and should be equipped to render such treatment as is necessary until injured persons can be removed to a hospital. The ambulance service should be under the medical chief and only non-walking cases should be sent to hospitals by ambulance.

In addition, the medical chief should watch the sanitary service in all aspects from garbage removal to sewage disposal, in order to prevent disease or epidemics. He should consult with local health authorities regarding emergency sanitary measures for protection of water and sewage systems, especially the avoidance of cross-connection between safe and unsafe water supplies.

Finally, the medical chief should arrange for the salvaging and decontamination of materials damaged by gas bombs or in other ways, when such salvage is possible.

Maintenance Services

Protection and repair of the buildings and equipment, and protection of materials, are the main responsibilities of the head of the maintenance services, who is generally the plant engineer or

British Combine

Employes should be trained to work while wearing gas masks. These English girls are undergoing anti-gas training while engaged in the manufacture of soup.

chief engineer. He should have as his assistants the skilled workers in the plant who deal with such plant utilities as electricity, steam, gas and water supply.

First activity of the maintenance chief should be to survey the plant and take steps for the protection of all buildings, with particular attention to the protection of vital equipment, materials and records. If permanent measures cannot be taken, then temporary expedients should be adopted.

One thing needed in particular is the storage of food materials in locations safe from the flying glass particles that always accompany bomb explosions. These glass particles have a way of getting into almost any plant spaces except completely enclosed, sealed, windowless areas. Avoidance of glass particles in foods is a prime necessity.

Next, control of illumination and preparation for blackouts should be studied, followed by the adoption of means to control quickly, to any desired degree, all artificial light so that no light will be externally visible during a blackout.

Closely tied in with night-time blackouts is daytime camouflage. However, camouflage is a matter for experts, and the maintenance chief should consult with experts before any camouflage is attempted, or the results may be worse than no camouflage at all.

Air raid shelters are another responsibility of the maintenance chief. Should the degree of exposure to raid danger warrant, he should prepare shelters for protection of the plant personnel from both gas and bombs. Consideration should be given to the safety afforded by these shelters, to entrances and exits, lighting, sanitary facilities, heating and ventilation. Provision should be made for serving light lunches in shelters during extended air raids.

The maintenance chief should also arrange to have dependable men stationed at various utilities, such as telephone switchboards, electric, gas, steam and water controls and boilers. These men must remain at these posts during an air raid to handle any emergency that may arise. Because these men are tied to their posts, other men should be available who are competent to make emergency repairs. It is also a good measure to provide for a standby power source, in case the power plant is damaged.

Immediately after an air attack, a survey of the plant should be made by the maintenance chief, and the extent of the damage determined. Any dangerous walls or foundations should be shored up or demolished. Debris should be removed. Conditions should be restored to normal as rapidly as possible, although permanent repairs can be made at some later time.

GET THESE PUBLICATIONS

Send 50 cents to the Superintendent of Documents, Washington, D. C., and get these publications, which will help you organize your plant for protection against raids and sabotage:

1. **Blackouts. Price 25 cents.**
2. **Civilian Defense – Protective Construction, Structure Series, Bulletin No. 1. Price 25 cents.**
3. **Protection of Industrial Plants and Public Buildings. Gratis.**

Adapt Plan To Needs

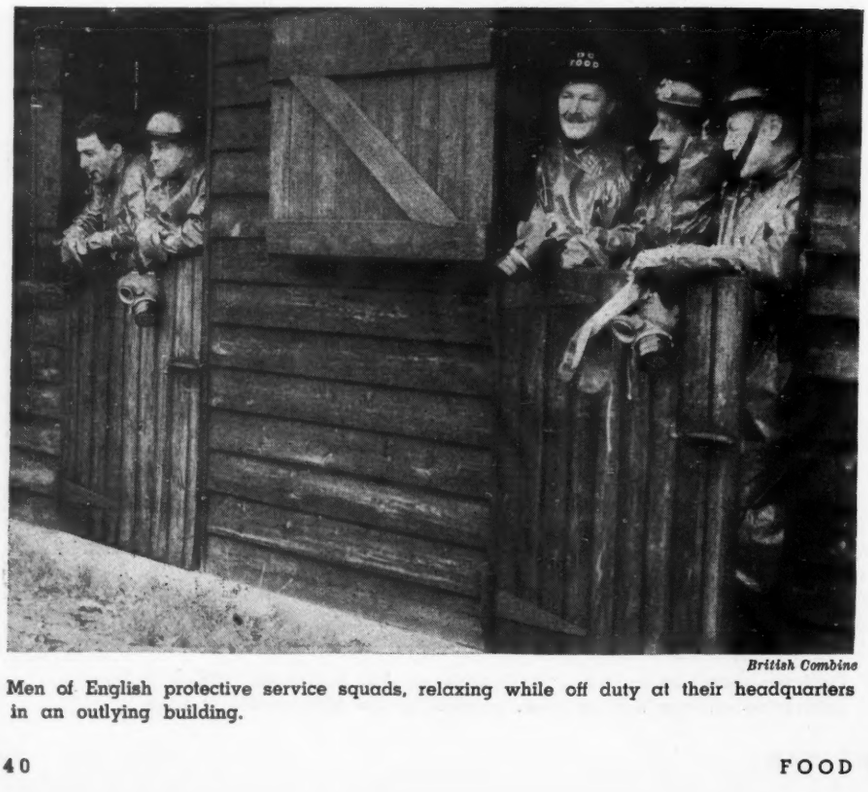
Most of the recommendations just outlined have been taken from publications of the Office of Civilian Defense. In applying them to the food plant, the management should keep in mind that the recommendations are mostly general, for all types of plants. Special needs of food processing, such as the careful protection of food materials from sabotage or raid damage, will require special plans developed to suit the needs of the individual plant and the food materials that it handles. Obviously, a grain mill, with its special fire hazards, will require measures different from those necessary in a meat packing establishment, with its requirement for refrigeration of the product.

Another thing to keep in mind is the necessity faced by the small plant for adapting the general plan to its needs. No small plant has available all the men whose services are called for by the general plan. However, a defense coordinator can be appointed by any plant and he can then study the needs of the plant and arrange his personnel to provide the essential services.

Finally, the plant management and its defense coordinator should be governed in what they do by the probabilities in their particular case. It is not likely that a canning plant in Utah or eastern Colorado need pay much attention to blackout precautions, whereas prevention of sabotage may be as important as in any other location. In contrast, a salmon cannery in Alaska will need full blackout protection and must be ever on the alert against bombing.

No great investment in protective measures should be made until the necessity for the expenditure has been determined.

In any case, what is done should be carried out with the advice and recommendations of the local civilian defense authorities, with whom each plant management should cooperate to the fullest extent.



British Combine

Men of English protective service squads, relaxing while off duty at their headquarters in an outlying building.

For those desiring extra copies of this article on protecting plants from bombs and sabotage a limited number of reprints is available at a price of 10 cents each. Address orders for reprints to FOOD INDUSTRIES, *330 West 42nd St., New York, N. Y.*

MORE ARTICLES *on wartime problems will be published in future issues of* FOOD INDUSTRIES *as soon as the information becomes available. Some of this material will be based upon British experience and some on situations within the United States.*— THE EDITORS.

What's Known Today About Dehydrating Vegetables

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PART II*—This is the second in a series of articles giving you a wealth of up-to-date and authentic information on vegetable dehydration. The different types of dehydraters are described and the principles of dehydration discussed

DEHYDRATERS are of many designs, but they may be placed in two classes; namely, air dryers and vacuum dryers. Air dryers are subdivided into natural-draft and forced-draft dryers.

Owing to limitations of space and to the fact that the information is available in other publications, the design, construction, engineering and principles involved in dehydration are not presented fully. For such discussion see the references listed in footnotes 11, 12 and 13 and also the University of California Agricultural Experiment Station Bulletin, "Dehydration of Prunes."

Natural-draft Dehydraters

In these dryers the air beneath the drying compartment is heated, and then, being lighter than the adjacent unheated air, rises through the trays or drying floor. The heat carried to the product in this manner causes evaporation of moisture, and the moisture-laden air escapes through the ventilator. In these driers it is difficult to control the temperature closely. Furthermore, they are inefficient in their use of heat and therefore are wasteful of fuel. They are, however, usually less costly to build than forced-draft dehydraters.

A common natural-draft dryer is that known as the tower or stack evaporator in which a number of trays rest on runways, one above the other and above the furnace and heating pipes. The freshly loaded tray enters the top-most runway and is transferred downward periodically each time a tray of the finished product is removed from the lowermost runway. Thus, the trays progress downward from the coolest, most moist section to the hottest and driest.

In the Oregon tunnel dryer the drying compartment is sloping and fitted with long tray runways, each holding several trays. One end of the tunnel is above the furnace room. The heated air entering the throat of the tunnel follows the slope of the tunnel upward and flows between the trays to the spent air outlet.

The kiln dryer used for drying apples has also been used for the drying of vegetables, but it is not very satisfactory for this purpose.

While natural-draft driers are inefficient and wasteful of fuel, as well as high in labor cost, they can be used for drying of vegetables if operated carefully and intelligently.

Forced-draft Tunnel Dehydraters

Forced draft dehydraters are of several types; namely, unmodified tunnel, using cars; compartment; combination tunnel and compartment; and continuous (tunnel or compartment with conveyor belts). In addition, forced draft may be installed in kiln, Oregon tunnel and tower (stack) evaporators, although normally these are natural-draft driers.

The usual forced-draft tunnel dehydrater consists of a chamber longer than wide, through which the product to be dried moves progressively on trays on trucks. A blast of heated air is blown continuously across the trays.

Usually the cars of trays enter the cooler, more moist air at the exhaust end and are removed at the hotter, dryer end of the tunnel. Many of the prune dehydraters in California are of this type. It is simple in design, construction and operation, as well as efficient in its use of heat and labor if properly operated. There are hundreds of these dehydraters in California and they could, with additional equipment for peeling, blanching, and so forth, be used for vegetable drying.

The air may be heated by steam coils,

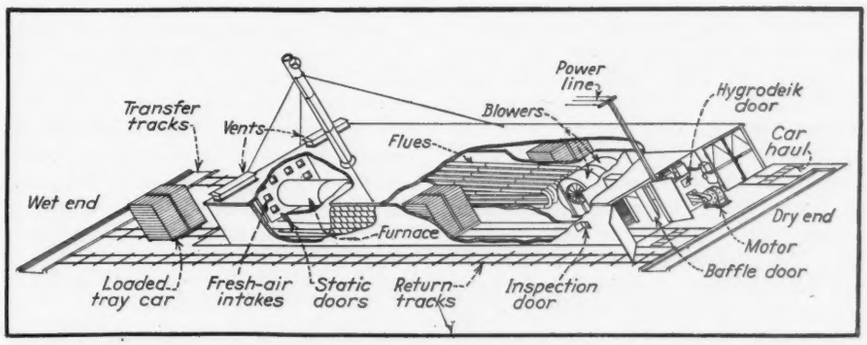


Diagram of indirect-heat type of dehydrater built by Chapman Dehydrater Co., Inc.

*This series of articles on the dehydration of vegetables is largely a compilation of the information existing at the time the manuscript was prepared. Research will undoubtedly bring about changes, but for the present the series constitutes a complete and up-to-date "handbook" on vegetable dehydration.

by heat radiated from a direct-fired furnace and flues, by electrically heated grids or directly by the products of combustion. Heating the air by electricity is too costly, except for high priced products such as candied fruit. Direct heat, if natural gas is the fuel, is perfectly satisfactory and is the most efficient method of heating air. High grade distillate has been used successfully for heating air by this system for prune drying. With both fuels the products of combustion pass through the drying chamber and come in contact with the drying fruit or vegetable.

The air is moved by a fan of some sort. Multivane and aeroplane propeller fans are superior to inefficient and inexpensive disk (wind-mill type) or paddle-wheel fans.

The furnace room and air heating chamber may be placed beneath the drying tunnel, or above or beside it. The last named position is the customary one. It may also be placed at one end, but in that position the cars must be turned or transferred upon either entering or leaving the tunnel. The other locations of the heater allow straight flow of cars.

It is customary to provide for recirculation of most of the air used in drying; usually the air heating chamber constitutes the air-return duct. The return duct should be large so as not to impede air flow. Recirculation makes for greater efficiency in the use of heat.

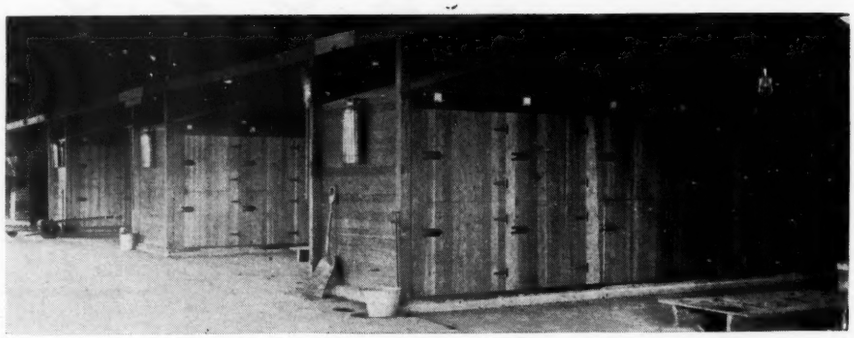
The cars of trays may travel on steel rails, or on a concrete floor if they are equipped with castor wheels.

Air-blast Compartment Dehydrater

In this dehydrater cars of trays or trays on runways enter the dehydrater from the side and remain stationary throughout the drying period. Heated air is forced across the trays, usually from the side. That is, the air travels only the width or length of one tray, in this respect differing from that in the air-blast tunnel, in which it usually travels across five to ten trays.

Air-blast Combination Compartment and Tunnel

In this dehydrater the cars enter at one end of the tunnel, but the trucks are separtaed from each other by wall baffles that permit the cars to be moved forward periodically, making essentially a compartment for each car. A small fan beside or above each compartment forces heated air across the trays at right angles to the long diameter of the tunnel, and auxiliary heaters maintain the air temperature. A large fan draws or forces the air through the tunnel and recirculates much of it through a large heating chamber. The air is thus given a spiral forward motion. The air is maintained at near the maximum temperature throughout the length of the tunnel, so drying is rapid.



Natural-draft stack evaporator at Yuba City, Calif.

Air-blast Continuous Dehydrater

This dehydrater consists of a tunnel through which the product to be dried is carried by an endless woven-wire or similar metal belt and is subjected to a blast of heated air. While handling costs are low, the drying area is small in comparison with that of a tunnel of similar cross section equipped with trays. Such driers have been used for drying sliced, raw potatoes, soap chips, starch and chemicals, but since the length of the drying period is not easily changed to suit variations in condition or size of pieces being dried, it is not particularly desirable for the drying of vegetables.

Vacuum Driers

Drying in a vacuum under reduced pressure gives a superior dried product, but the equipment is costly and operating costs are high.

Principles of Dehydration

Excellent papers on the principles of dehydration are those of Ridley and Christie,[13] Ridley,[14] and Rosseau.[15] Only a brief resume will be given here. See also *Bulletin* 404 of the Agricultural Experiment Station, University of California, "Dehydration of Prunes."

Functions of Air

Air has two main functions in drying: It conveys heat to the product to be dried and carries away the moisture evaporated from the product. In the drying of fruits and vegetables, several times as much air is required to transport heat to the product as to transport the moisture evolved from it—in a typical example with fruit, seven times as much.

Role of Heat

Much more heat is required to change the moisture from the liquid to the vapor state than to heat the product from the initial to the dehydration temperature. About 1,000 B.t.u. is required to evaporate one pound of water, while only 80 B.t.u. is required to heat it from 70 deg. F. to a dehydration temperature of 150 deg. F. (One B.t.u. is the heat required to raise the temperature of one pound of water 1 deg. F. The heat required to change the water to vapor is the latent heat of evaporation.)

Heat Requirements

The amount of water to be evaporated to produce one pound of dry product varies greatly with the moisture content of the raw material. Thus, if the product has 50 percent moisture before drying it is necessary to evaporate only one pound of water for each pound of dry product. If the moisture is 90 percent, then it will be necessary to evaporate 10 lb. of water for each pound of dry matter.

Similarly, the heat requirements in the two cases are approximately 1,000 B.t.u. and 10,000 B.t.u., respectively.

Air Requirements

Ridley [14] estimates that for the drying of apples in an air-blast dehydrater holding 10 tons of fruit, having a drying period of 10 hours and a drying ratio of 6:1, it would be necessary to remove about 16,666 lb. of water in 10 hours, or 27.7 lb. per minute. An ingoing air temperature of 160 deg. F., an outgoing temperature of 120 deg. F. and an output of 0.01807 B.t..u per cubic foot of air per 1 deg. F. drop are assumed.

An overall requirement of 1,080 B.t.u. per pound of water evaporated (includes raising temperatures from room temperature to 160 deg. F.) is taken. With these assumptions the air required to evaporate one pound of water would be about $1,080/(0.01807 \times 40)$ or about 1,500 cu.ft. per minute. For 27.7 lb. of water evaporated per minute the total volume of air required would be about 41,550 cu.ft. per minute. Cubic feet may be changed to lineal feet, that is velocity, by dividing by the

cross sectional area of the free air spaces in the drying tunnel.

The air requirement for sliced carrots would be similar to that for sliced apples, as the drying ratios are similar. For cabbage, spinach and other watery vegetables the requirement would be greater and for corn, sweet and white potatoes somewhat less than for apples. Inadequate air supply is the most common cause of slow drying.

Air Velocity

The velocity is also a function of the air volume and greatly affects its drying capacity. For drying of vegetables the velocity across the trays should be not less than 500 linear feet per minute. The evaporation of water from a free surface is directly proportional to the velocity of the air, other things being equal.

In experiments made by Christie and Matsumoto [10] the effect of air velocity at 160 deg. F. on the length of time required to dry carrots, cabbage and peas was found to be as shown in Table IV.

Doubling the air velocity did not cut the drying period in half, although it reduced it materially. Probably the rate of diffusion of moisture to the surface was as important a factor as the air velocity.

Recirculation of the Air

Obviously, some of the spent air must be allowed to escape from the dehydrater in order that drying may proceed. However, much of the air may be recirculated, reheated and used again in drying, fresh air equal in volume to that exhausted being admitted. Recirculation makes use of some of the heat remaining in the spent air.

On the other hand, its moisture carrying power is less than that of the drier, heated, fresh air. Consequently, where maximum rate of drying of the vegetables is desired, recirculation would not be used. If the exhaust air is completely saturated with moisture there is little to be gained by recirculation. This is very apt to occur when dehydrating rapidly drying products in a long tunnel.

Parallel-current System

In the normal operation of air-blast, tunnel dehydrators the counter-current method is employed, in which the car load of vegetables enters at the cooler air exit end of the tunnel and progresses toward the hot air entry end. In the parallel-current method the fresh vegetables enter at the hot end of the tunnel and progress toward the cool end.

The parallel-current system is apparently the more logical for vegetables, as it makes use of the fact that as long as the vegetables are wet and give up moisture rapidly they are not injured by high temperature, because the rapid evaporation cools and maintains them at about wet-bulb temperature. (See paragraph on relative humidity). Therefore, relatively high temperatures can be used at that stage and correspondingly rapid drying attained. As the trays progress toward the exit, the temperature drops and drying is finished at a temperature sufficiently low to avoid damage to flavor and color. The difficulty is to attain uniform drying on all portions of the tray; drying is considerably more rapid on that side of the tray toward the hot air entry end of the tunnel.

Nevertheless, for most vegetables and particularly spinach, cabbage, sliced string beans and peas it is worthy of consideration.

Effect of Temperature on Drying Rate

Christie and Matsumoto [10] dehydrated sliced carrots, cabbage and peas at several different temperatures and an air velocity of 500 linear feet per minute. A summary of their results appears in Table V.

Raising the temperature increases not only the vapor pressure of the moisture, that is its tendency to vaporize, but also increases the moisture-carrying power of the air and decreases its relative humidity. All of these changes favor an increased drying rate.

Critical Temperature

As noted in a previous section, while the vegetables are high in moisture, evaporation of water is so rapid that they do not reach a temperature much above the wet-bulb temperature. In fact, while in that condition a temperature of 200 deg. F. or higher may be used without damaging the product.

However, when the moisture content has dropped to a low value near the end of the drying period the moisture no longer comes to the surface in sufficient amount to maintain rapid evaporation. Consequently, the product rises in temperature and attains practically the dry-bulb temperature during the last stage of drying. At that time also the sugars and other constituents have been highly concentrated and are thereby made more susceptible to injury by heat. The temperature at which the nearly dry product is seriously injured is spoken of as the critical temperature. For most vegetables the finishing temperature should not exceed 150 deg. F., that is, the critical temperature is in the neighborhood of 150 deg. F.

Above their critical temperature blanched potatoes develop a reddish color and a disagreeable flavor; other vegetables darken in color and are injured in flavor.

Mangels and Gore [10] classified vegetables with respect to sensitiveness to heat as follows: Very easily injured—onions, turnips, celery, tomatoes and cabbage. Fairly resistant—white potatoes, carrots, string beans and sweet corn. Very resistant—sweet potatoes.

Relative Humidity

The percentage of saturation of air with moisture vapor is spoken of as the relative humidity. The saturation point is 100 percent relative humidity and is also known as the dew point. At 50 percent relative humidity the air contains one half as much moisture as at 100 percent relative humidity.

The higher the temperature of the air the greater its moisture-carrying power. Therefore, raising the temperature decreases the relative humidity. Thus at 180 deg. F. and 90 percent

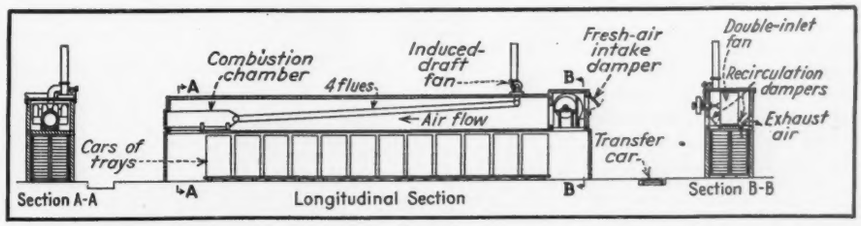
(Turn to page 96)

TABLE IV—Effect of Air Velocity on Length of Time to Dry Carrots, Cabbage and Peas.

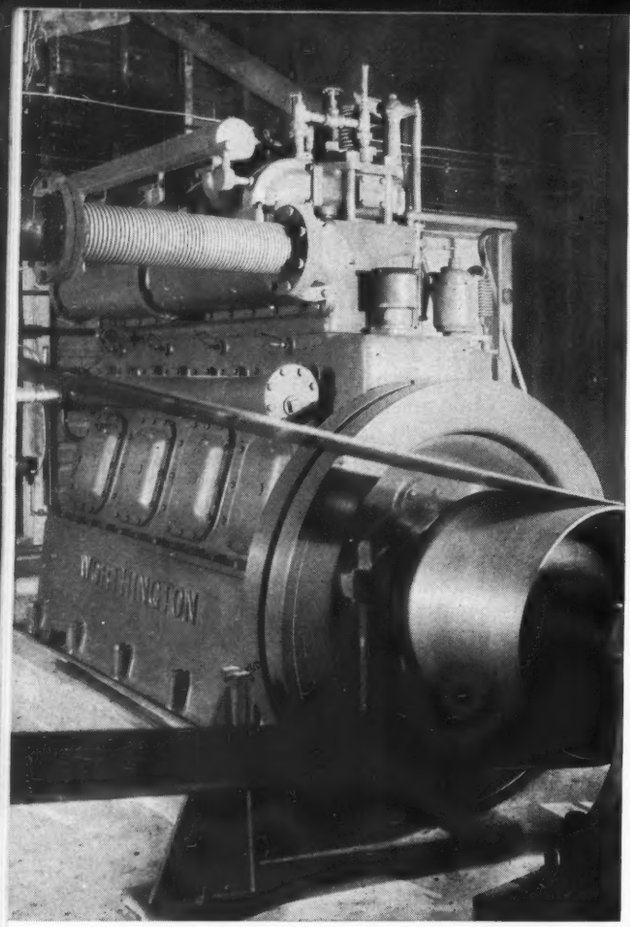
Air velocity in linear feet per minute	Carrots, Hours to dry	Cabbage, Hours to dry	Peas, Hours to dry
250	5.3	5.5	4.7
500	4.0	4.0	3.3
750	3.5	3.5	2.6
1,000	3.0	3.2	2.0

TABLE V—Effect of Temperature on the Drying Time of Carrots, Cabbage and Peas.

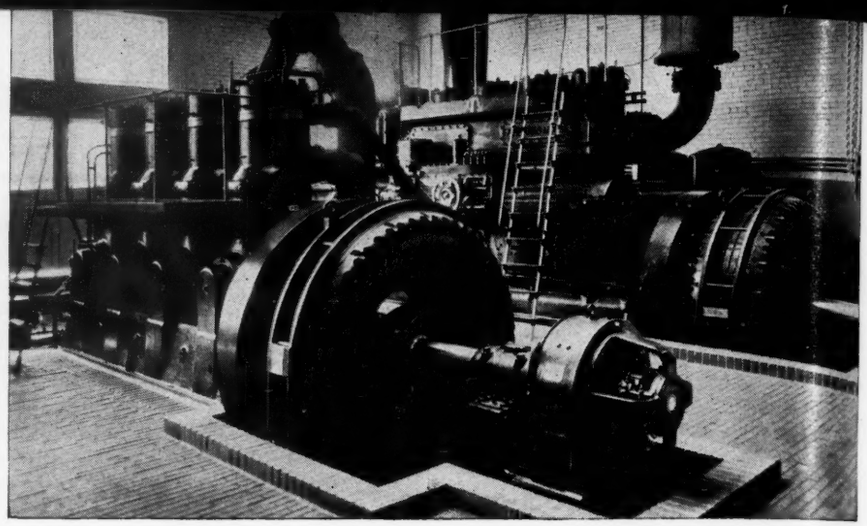
Temperature, deg. F.		Carrots, Hours to dry	Cabbage, Hours to dry	Peas, Hours to dry
Dry bulb	Wet bulb			
120	76	7.0	...	...
130	82	6.3	5.0	5.5
140	85	5.0	...	...
150	88	...	4.5	5.0
160	94	4.0	4.0	3.3
180	100	3.5	2.7	3.0



Sectional view of air-blast recirculating tunnel dehydrater designed by G. B. Ridley.



Liberty Milling Co., Germantown, Md., uses a 200-hp. diesel operating through a belt drive. It is a Worthington Pump and Machinery Corp. unit.

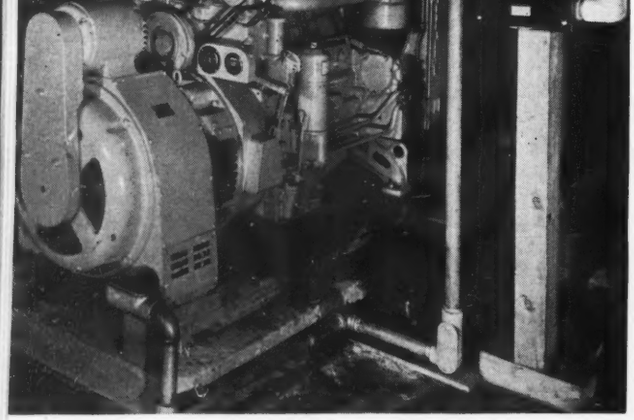


Two diesels, rated at 280 and 700 hp. (left to right) generate electric power at the new Progress Brewery at Oklahoma City, Okla. Both are 4-cylinder Fairbanks Morse units.

WAYS TO GET MORE

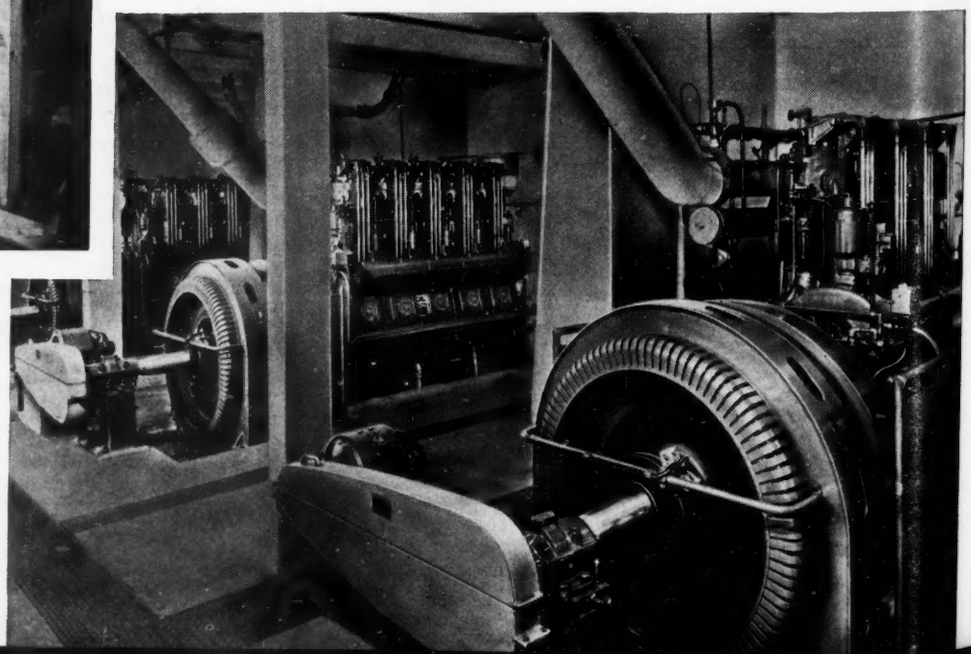
NOT only does a power shortage threaten various sections of the country under the ever-increasing demands of the war industries, but there is the possibility that sabotage or bombing of power plants will cut off the power supply.

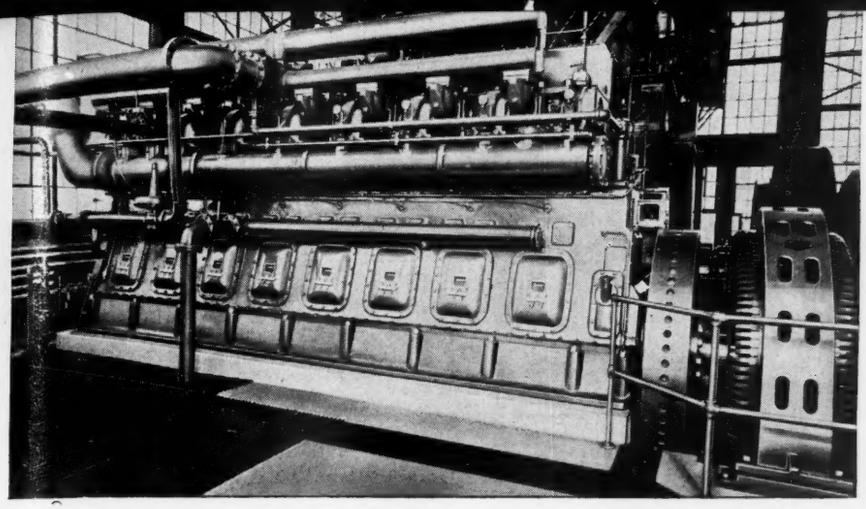
Conditions being as they are, food processors might well consider the advisability of installing emergency or standby power units. Diesel engines are one of the most economical sources of such power, operating at a low fuel cost and lending themselves to utilization of waste heat from the cooling water and the exhaust. And to show the uses to which these power units already are being



Power-cost savings of $100 a month, and more in the busy season, are realized by Lake City (Iowa) Creamery with this Caterpillar diesel-electric set. The unit generates power for a creamery that has an annual output of 550,000 lb. of butter and operates 550 storage lockers, a —12 deg. F. ice cream storage room and a cooling system.

Stahl-Meyer, Inc., uses three diesels of 200, 250 and 300 hp. in its meat plant at Brooklyn, N. Y., for reliable, low-cost generation of its electric power requirements. These are Chicago Pneumatic units.



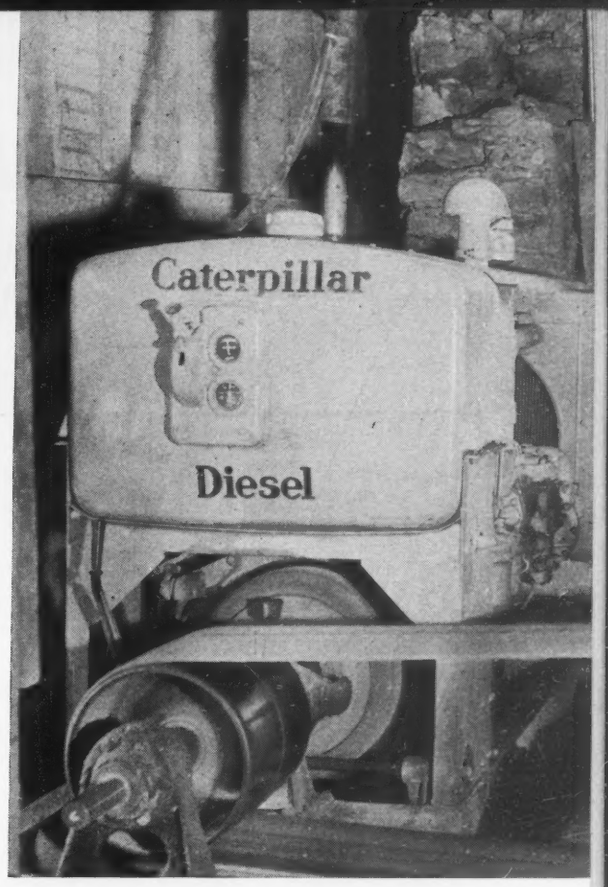


Red Star Milling Co., Wichita, Kan., generates electric power with this 920-hp. diesel made by Worthington.

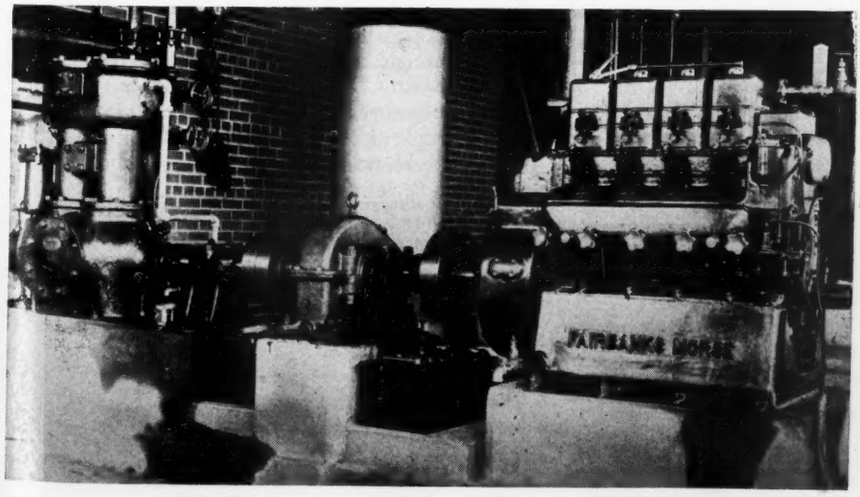
WARTIME POWER

put in the food industries, several installations are illustrated on these pages.

Diesels, however, are not the only source of standby power. Gas engines prove efficient in localities where natural gas is available at low cost. Moreover, gasoline engines can be employed. With a bit of ingenuity, plant engineers can even harness one or more used automobile engines to their plant operations. Fuel for these engines is relatively expensive, but in a war-time emergency economy comes second to production of the needs of this and the other United Nations.

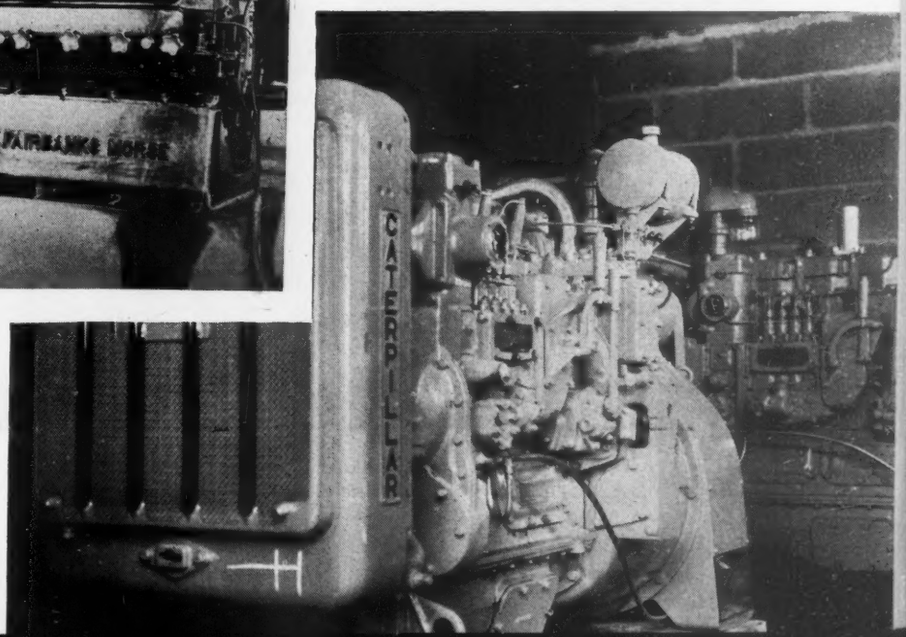


Flour mill machinery in a plant owned by Dorothy M. Bohner, Pillow, Pa., is driven through belts by this Caterpillar diesel. Operating 10 hours a day, the engine uses 2 gal. of 6½-cent fuel per hour and the mill produces 10 bbl. of flour and 6 to 8 tons of feed a day, in addition to 4 tons of ground corn a week. When the picture was taken the engine had operated 4,750 hours without trouble.



A saving of $61 a week against the cost of purchased power has been realized by Martin Century Dairy Farm, near Lansdale, Pa., by the use of this diesel to drive an ammonia compressor. Operating through reduction gearing, the diesel is a Fairbanks Morse 4-cylinder unit.

Power for refrigeration, lights and various small motors is furnished in the plant of Sterling (Colo.) Packing & Provision Co. by two Caterpillar diesel-electric sets. These engines operate 12 to 24 hours a day, and each uses 1½ gal. of 8-cent fuel per hour. They replaced purchased power.



QUALITY CONTROL

Inhibiting Mold and Bacteria • Controlling Vitamin A in Butter • How Meat Shrinks • AMS Standards • Long Hearings Delay FDA Standards

Preventing Spoilage By Mold and Bacteria

By ELMER F. GLABE

Chief Chemist, Food Research Division, Stein, Hall Manufacturing Co., Chicago, Ill.

If you are faced with mold or bacterial deterioration of a finished product, chances are that you can borrow some valuable knowledge from the bakers. Years of experiment and research have given them four inhibitors of mold and bacterial growths

SUSCEPTIBILITY of all foods to deterioration by microorganisms makes the combatting of mold and bacterial growths an industry-wide problem. How best to carry on the fight against spoilage of foods or loss of food value by these organisms is often puzzling. Among the divisions of the food field in which the problem is highly complicated is the baking industry.

Public disclosure of this fact was made at the hearings on definitions and standards of identity for white bread, rolls and other bakery products, held in Washington, D. C., July 7 to August 15, when important information on the subject was read into the record.

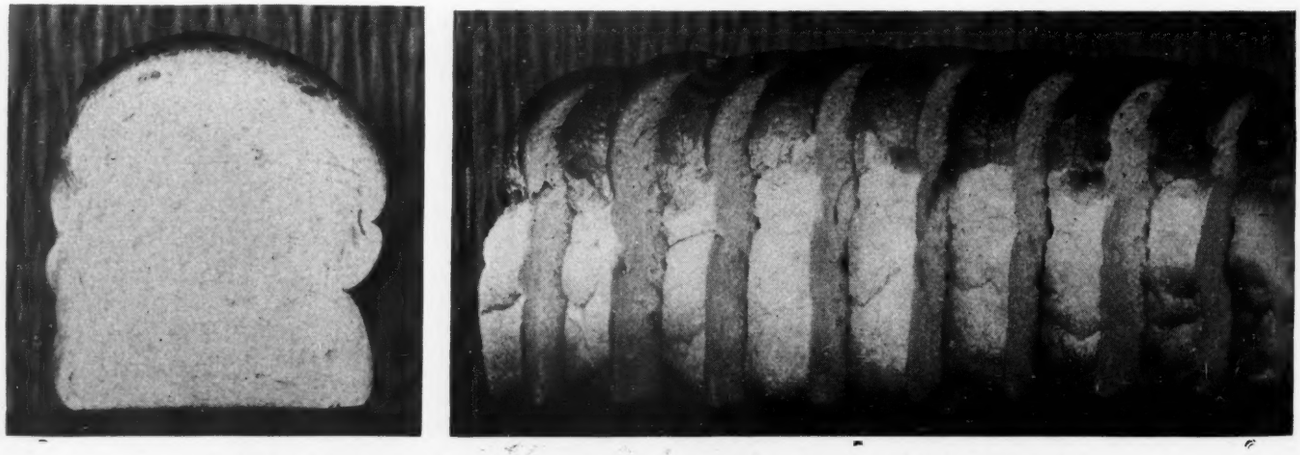
At these hearings economic losses due to the unsalability of bread attacked by mold and rope were pointed out as being considerable. Pirrie (*Baker's Weekly*, June 9, 1934) estimates that annually "one hundred million loaves of bread are not salable because they become moldy." Dr. King, formerly with the Bureau of Home Economics of the Department of Agriculture, testified at the hearings on a spot survey made in rural New England. She found that 20 percent of the families in that territory had difficulties in the home with mold on bread bought in the store.

Most weighty of all, however, were the results of a survey made among the producers of bread themselves. The American Bakers Association sent out a questionnaire to commercial bakeries of the United States while the hearings were being held in Washington. Some 269 baking companies, operating 683 plants, answered the questionnaire. Of these, 221 bakers (82 percent) reported that they had at one time or another had trouble with an epidemic of moldy bread in their plants. Seventy-eight (25 percent), reported they had experienced trouble with rope infections in the bread they produced.

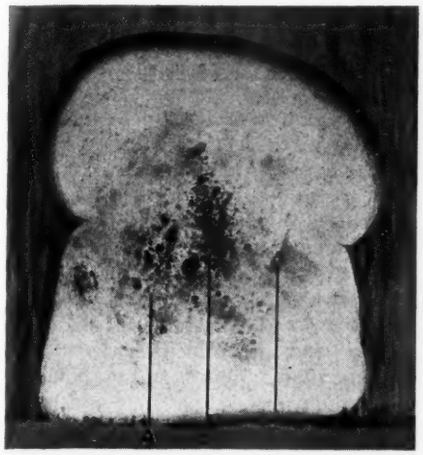
Judging from these reports, the control of mold and rope in bread is a serious problem among the commercial bakers, even today after years of study on how to overcome this economic loss. Slicing and wrapping of bread have added to this problem because mold and rope find adequate moisture for growth on bread enclosed in a tight transparent cellulose or waxed-paper wrapper which protects the product from moisture losses.

Characteristics of Molds

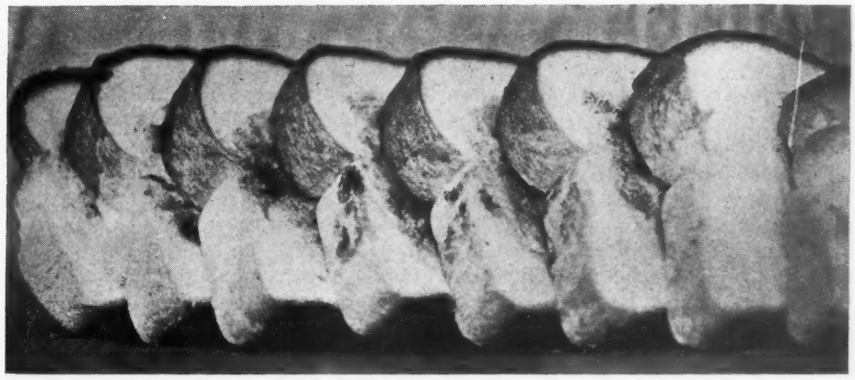
Mold infection of bread has been found to be definitely air borne. Molds propagate by means of spores. Yet, though almost all ingredients used in making bread contain some spores, bread-oven temperatures of about 400 deg. F. kill them. However, since molds are so widespread in nature, they are



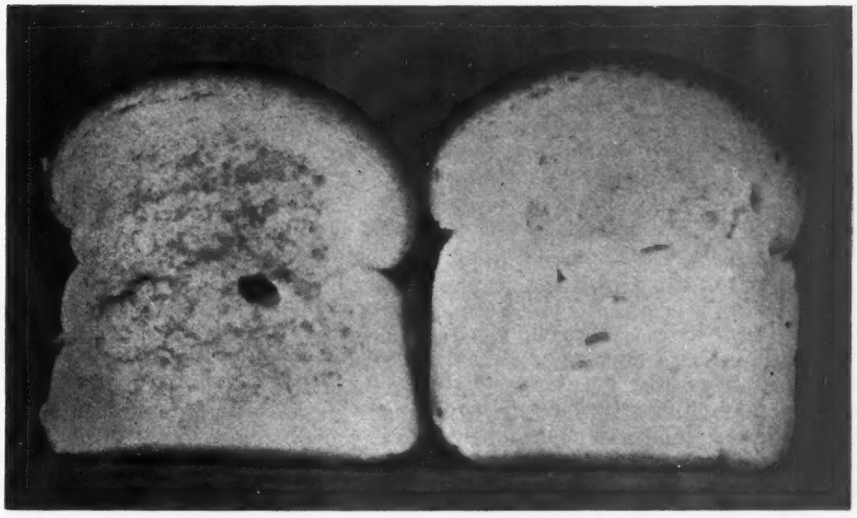
Inoculated bread containing sodium diacetate as a mold and rope inhibiting agent shows no indication of microorganism growth either inside or on outer surface, after five days



Common molds attacking bread are: (A) *Rhizopus nigricans*, (B) *Aspergillus niger*, (C) penicillia.



Mold-inoculated bread containing no mold inhibiting agent becomes overgrown after five days.



Rope-inoculated breads of same ingredient composition were baked and incubated under identical conditions except that loaf on right contained sodium diacetate as a mold and rope inhibitor. Inhibitor has no apparent deleterious effect upon yeast growth and dough development.

quite generally present in and about bakeries, in the air of cooling rooms and on slicing and wrapping apparatus and other equipment. Because of their presence in these places they find their way to the bread after it has been baked.

Molds find in bread a natural medium for growth. It is moist and contains carbohydrates and proteins. When summer temperatures are prevalent, molds may often make a visible appearance within 36 hours, although two to three days is the average length of time. The conditions under which most bread is cooled, wrapped and stored have a great effect upon the tendency for molds to appear. That many opportunities exist for bread to become infected with mold is quite apparent.

Mold growth appears as a multicolored array on bread. It grows on the exterior of the loaf as well as on the surfaces of the slices. Some of the more common molds attacking bread are the black ones, *Aspergillus niger and Rhizopus nigricans*. *Pencillium stoloniferum* (green mold) and *Monilia sitophilia* (pink mold) also are commonly found on bread.

Characteristics of Rope

Most important of the bacteria which attack bread is *Bacillus mesentericus*, of which there are several varieties. All, however, have the common characteristic of growing in the heart of the loaf and reducing it to a sticky, stringy, brown colored, evil smelling mass. The name "rope" is derived from the "string" characteristic of its growth mass.

Rope bacteria are thermophilic. They are common inhabitants of the soil. They gain entrance to bread almost exclusively through ingredients. Surviving oven temperatures, they also find in bread an ideal medium for growth. During the summer when high temperatures and high humidity conditions prevail, rope will often make its appearance in bread that is 24 hours old. The first indications of its presence are a vaguely offensive odor and flavor, which may develop in bread even during cool weather. Soon after this, the crumb structure deteriorates, with an increase in the offensive odor, a light brown coloration and the development of "string" which is easily observable. The result is a lost customer for the baker.

Discovery of Inhibitors

As was previously pointed out, evidence at the hearings in Washington shows that even strict sanitation is no absolute insurance against mold and rope troubles in bread. The baker has been aware of this for many years; as far back as the 1850's literature indicates that adding vinegar to the dough batch reduces trouble with rope. The use of vinegar was the beginning of the practice of adding small quantities of harmless chemical inhibitors to the dough to give added protection against the ravages of microorganisms.

Next in the succession of discoveries was the use of monocalcium acid phosphate. Along with this came the finding that a lowering of the pH of the bread is an important factor in rope control. However, lowering of the pH by using inorganic acids such as hydrochloric or sulphuric acids is not possible; they deleteriously affect fermentation and the characteristics of the finished loaf. Instead, an organic acid must be used.

Mold Control by Inhibitors

Vinegar and monocalcium acid phosphate are potent enough in eliminating rope infections, but they are ineffective as mold deterrents when placed in the dough batch.

Various research workers in the last decade found that a number of organic

acids have an inhibitory effect on the growth of molds. Within certain limits the potency of the monocarboxylic acids as inhibitors was found to increase as the number of carbon atoms increased. But, unfortunately, as the series of carboxylic acids is ascended the objectionable odor and flavor left in the bread made from dough containing these acids also increases. The potent stench of butyric and valeric acids is well known to any chemist. Obviously these acids cannot be used in bread without destroying its palatability.

Specifications for an Inhibitor

Any material which is to be used as a rope and mold inhibitor must be nonpoisonous, be potent against mold and rope at low concentrations, have no deleterious effect on fermentation or loaf characteristics, and be available in dry powder form. The critical characteristic of an inhibitor, however, is its effect on odor and flavor. A compound may be a good mold and rope inhibitor and still be useless, or relatively so, because it adds a foreign odor and flavor to the finished product.

Recently Discovered Inhibitors

One of the lower acids in the monocarboxylic series is propionic. Recent work has shown that the calcium and sodium salts of this acid are effective mold and rope inhibitors. These materials are being used commercially today.

The most recently discovered inhibitor which falls within the prescribed specifications is one derived from acetic acid. This acid is even lower in the chain of monocarboxylic acids than is propionic. It is the active ingredient of the vinegar used by bakers for many years.

Vinegar is an impure solution of acetic acid. When using vinegar to get acetic acid one also takes with it the flavoring compounds, the aldehydes and esters, which are often noticeable in bread. The acid itself is a liquid and is therefore difficult to handle and undesirable in baking procedure. To be uniformly mixed into the dough batch it should be added with the water—difficult to do because most bakeries meter ingredient water and add it as mixing proceeds. The normal sodium salt of acetic acid has practically no inhibitory effect, differing from the normal propionic acid salt in that respect. However, very recent research work has revealed that the peculiarly bound compound of sodium acetate and acetic acid, known as sodium diacetate, exhibits strong mold and rope retarding properties. This degree of inhibition is greater than that exhibited by vinegar or acetic acid alone.

Recently, large-scale manufacture of sodium diacetate has been accomplished, and it, too, is being successfully used commercially. Sodium diacetate contains the specific inhibitor, acetic acid, bound up with its natural sodium salt. The position of acetic acid in the chain of fatty acids indicates clearly what is found in baking practice—there is no effect on flavor.

How these inhibitors, sodium diacetate, vinegar, monocalcium acid phosphate and the propionates, work in their action against microorganisms is still largely a matter of conjecture among chemists and bacteriologists. Evidence is steadily being amassed, however, and the principle will no doubt some day be discovered.

The use of ultraviolet light in killing mold spores on the surface of bread is also being employed by bakeries. This practice is definitely a sanitation procedure. Control of molds and rope thus begun is supplemented, however, by the use of an inhibitor in the bread itself, thereby protecting it when the bread is in the consumer's bread box.

To what extent an effective mold and rope control program can be practiced generally in food manufacture is worthy of consideration. Thus far, experiments and research work have led to the discovery and subsequent use of only four inhibitors in baked products. These are vinegar and monocalcium acid phosphate as rope inhibitors and propionates and sodium diacetate as rope and mold inhibitors. But these compounds are worthy of investigation by any food processor faced with mold and bacterial deterioration of his product.

Feeding of Cows Controls Vitamin A Content of Butter

By SIGFRED M. HAUGE

Department of Agricultural Chemistry, Purdue University Agricultural Experiment Station, Lafayette, Ind.

It is becoming increasingly important that the vitamin A potency of butter be kept at the highest possible standard. And this can be done, research shows, by feeding a high-vitamin ration to the cows. Of course, butter manufacturers must avoid loss of the vitamin in processing, storing and distributing the butter

UNLIKE many foods under study today in connection with the vitamin enrichment program sponsored by the Committee on Foods and Nutrition of the National Research Council, butter cannot have its vitamin content adjusted by synthetic or chemical means.

By definition, legalized by Congressional action on March 4, 1923, butter consists of: "The food product made exclusively from milk or cream, or both, with or without common salt and with or without additional coloring matter. It contains not less than 80 percent by weight of milk fat, all tolerances having been allowed for."

No reference is made to its quality, to its nutritive value nor to its vitamin content. In fact, the Federal Food, Drug and Cosmetic Act of June 25, 1938, specifically states in Chap. IV, Sec. 401, that no definition for the standard of identity and no standard of quality shall be established for butter. That provision forestalls any manipulation of the constituents of butter to any other than natural components which go to make up the fat of milk and cream.

Dairy products, especially milk and butter, are recognized as important sources of vitamin A in the American diet. Their consumption is general and, because of the extent to which they are used, they contribute a considerable portion of the normal vitamin A required to promote and maintain good human health. Their processing, handling and marketing are carefully regulated and supervised in the interest of

public health to safeguard their inherent health-giving and growth-promoting qualities.

Since the discovery of vitamin A in milk fat, butter has come to be regarded as an excellent source of vitamin A. Partly on that account, butter commands a higher market price than do other edible fats. With butter commanding this premium price, a logical question arises as to the uniformity of the vitamin content and how this content can be raised to, and maintained at, any desired level without violation of the Federal Food, Drug and Cosmetic Act or boards of health rules and regulations.

Seasonal Variations Large

Considerable interest has been focussed upon this problem by numerous investigators. Surveys conducted in the United States, as well as in many foreign countries, show that seasonal variations in the vitamin A values of butters are considerable.

In general, butters of low vitamin A values are produced during the winter feeding season. In the early summer, when the cows are grazing upon pasture grasses containing an abundance of carotene, the butter becomes more highly colored and its vitamin A potency approaches a maximum value. As the quality of the pasture decreases, the vitamin A potency of the butter decreases until finally, after the pasture season ends, the vitamin A values drop to the characteristic low level of the winter feeding period. The potencies of summer butters may be from two to five times that of some of the poorer butters.

As the consuming public has become aware of these variations and has demanded higher quality in dairy products, the progressive dairyman and butter manufacturer have been attempting to meet this demand. The dairyman has to start with the cow and the feed she consumes, whereas the buttermaker has to start with the milk or cream he buys from the dairyman.

SIGFRED M. HAUGE

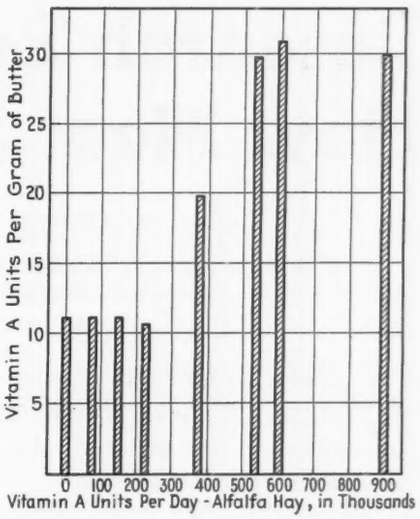
In either instance the problem of obtaining and maintaining the highest possible vitamin A potencies in the respective products is becoming increasingly important. No longer is milk, cream or butter judged altogether by flavor, cleanliness, wholesomeness and fat content. The emphasis which has been thrown on the vitamin content of other foods has served to show more clearly the importance of the vitamin content of such natural foods as butter.

Effects of Breed and Ration

The vitamin A potency of butter depends upon two components of milk fat, carotene and vitamin A. Part of the carotene ingested in the cow's ration is passed along directly into the milk, while a portion is converted into colorless vitamin A. Since the relative amounts of carotene and vitamin A in milk fat are dependent upon the quality of the ration and upon the breed and individuality of the cow, the program of vitamin A control in butter starts with the selection of the cow to be milked and the ration to be fed her.

Guernsey and Jersey butters are usually high in carotene and low in vitamin A, while the butters from such breeds as Holstein and Ayrshire are of lower carotent content and higher vitamin A content. The reason for this is that Guernsey and Jersey cows convert a smaller proportion of their carotene into vitamin A than do the breeds from whose milks are made the lesser pigmented butters. The extent of conversion varies also among individuals but to a lesser degree than among breeds.

The question naturally arises as to the effect of the breed of the cow upon the vitamin A potency of butter. To some, the assumption that the breeds which give the more highly colored milk fat are utilizing the carotene of the feed more efficiently, and consequently, are producing butter of higher vitamin A value has seemed logical. However, experiments at Purdue have shown that, in general, the different breeds on the same ration, or the same pasturage, produce butter of about the same total vitamin A potency. Similar conclusions may be drawn from the experiments at Ohio, Nebraska and Pennsylvania. As a consequence, consideration of the breed as a factor influencing or controlling the vitamin A potency of milk and butter may be eliminated. However, it should be kept in mind that when cows of different breeds are secreting butterfats of equal vitamin A potencies, the vitamin A values of the milks will naturally vary directly with their fat contents.



Effect of cow's ration upon vitamin A potency of butter.

The most important factor affecting the color and vitamin A potency of butter is the carotene content of the rations of the cows. When cows are fed the usual herbiverous diet, β-carotene may constitute as much as 90 percent of the color of butter. However, if other precursors of vitamin A are present in the ration, they will also contribute to the color of the butter. If the cow is fed carrots, the carotene content of which is approximately 75 percent β-carotene and 25 percent α-carotene, the butter will contain appreciable amounts of α-carotene as well as β-carotene. Furthermore, hays and silages may contain certain decomposition products of carotene which may contribute to the total color of milk fat without enhancing its vitamin A potency. Because of similarities in many physical properties, especially light absorption, these decomposition products usually have been measured as carotene.

Color Not Always True Index

The natural color of butter, its carotene content, is not always a true index of its vitamin content. Butters have been analyzed which contained approximately the same amounts of carotene and yet varied widely in their vitamin A values. Other butters of the same vitamin A potencies varied considerably in their carotene content. If the carotene content of butters from a known breed of cows is characteristically high or low for that particular breed, the color becomes a fair index of its vitamin A potency. However, in the case of market milks and butters, which are produced by many breeds under unknown feeding conditions, the carotene content

(*Turn to page 98*)

Research Reveals How Meat Shrinks

By WILFRIED HELLER

School of Chemistry, University of Minnesota, Minneapolis, Minn.

The mechanism of meat shrinkage has long been a mystery. It is one of the problems that bothers the meat industry. In this article is presented an explanation of the phenomenon. This is new knowledge, discovered through research *

A FRESH piece of meat shrinks upon being exposed to air. It loses in weight and volume. Although there are many papers on this well-known phenomenon, very little is known as to the nature and the mechanism of this type of meat shrinkage. New experiments have been carried out in order to clear up both. The present paper will deal with the shrinkage of meat in air of low moisture content.

Definitions

Weight shrinkage or shrinkage shall mean the loss of weight of the samples. For the loss of volume we will use the terms "volume shrinkage" or "contraction." "Area shrinkage" shall express the decrease of the external surface of the samples during volume shrinkage. The following abbreviations and symbols shall be used:

W_o—Initial weight in grams
W^1—Weight of shrunken sample in percent of W_o
L_w—Loss of weight in grams
L^1_w—Loss of weight in percent of W_o
S_o—Initial surface in cm.^{2}
t—Time elapsed since the start of the shrinking experiment
t_h—Time of the half value, i.e., time when $W^1 = 50$
V_o—Initial volume

Small pieces of veal, beef and pork were used. When not otherwise stated, they were hung on hooks. For the experiments at low temperature (3 to 5 deg. C.) we used a commercial mechanical refrigerator. For the experiments at room temperature (26 to 28 deg. C.), the samples were hung in a dark room which kept an almost constant temperature. Experiments at higher temperatures were performed in a constant-temperature oven. At all temperatures, the moisture content of the air was far below saturation.

The weight was determined by weighing, the volume by immersion. The surface area was either directly measured or calculated, if the shape of the samples was simple enough. Prior to any other experiments, we determined whether quantitative and reproducible results could be obtained with meat samples. The result was positive. The accuracy and reproducibility of results was very satisfactory when veal samples were studied. For beef, and particularly for pork, the situation was less favorable, but quantitative experiments were possible. The following data on the accuracy and reproducibility of measurements apply to veal.

Figures 1 and 2 show the scattering of the results, if weight measurements are made on samples taken from the same animal. Figure 1 gives statistics on the final weight of 27 samples shrunk as much as possible in a completely dry atmosphere (presence of P_2O_5) at 26 to 28 deg. C. The mean W^1 value is 23.7, the extreme values are 22.7 and 24.5, respectively. The statistics lead to the following error probabilities in which the technical error involved in weighing is considered.

Magnitude of error (*Percent deviation from mean value*)	Probability of such an error
± 4.0	0.037
± 3.0	0.18
± 1.0	0.30
± 0.05	0.74

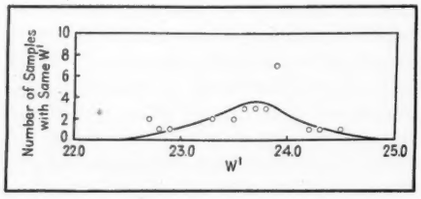


Fig. 1

The range of error is somewhat larger, but it hardly exceeds ± 5 percent, if transient W^1 values are determined. This is shown on some samples in Fig. 2. The most encouraging result, however, is that no definite increase in the scattering of data was found to exist. This was true if samples of different animals, killed at different times, were compared instead of samples taken from one animal. This is shown in Table I for the final W^1 values of veal shrunk in completely dry air at 26 to 28 deg. C. The age of the calves varied between 6 and 12 weeks.

The accuracy of volume measurements was somewhat less, but here, also, an error exceeding ± 5 percent was rare. From both weight and volume determinations, the specific density of fresh veal samples was determined. Among 15 samples taken from different animals, we found a mean value of 1.08, the extreme values being 1.043 and 1.095. (During the time of shrinking, the density of the samples grew smaller and finally became less than 1.0.)

The accuracy of the surface-area determinations was checked by comparing the directly measured and the calculated surface area of 10 cubical veal samples, the initial weight of which varied between 35.0 and 51.8 grams. The maximum positive deviation of the measured values as compared to those calculated (using 1.08 for the specific weight) was 11.7, the maximum negative deviation was 4.3, and the mean deviation was + 5.5 percent. Thus, the accuracy of surface-area determinations

TABLE I—Final Weight of Veal.

(In percent of initial weight after shrinkage in completely dry air at 26 to 28 deg. C.)

Date of killing	Number of samples	Range of W_o	Highest value	W' Final smallest value	Mean value
Mar., 1940..	12	7.85–240.2	24.9	23.5	24.2
Dec., 1940..	3	37.05–44.35	23.9	23.6	23.8
Feb., 1941..	27	56.05–64.65	24.5	22.7	23.7

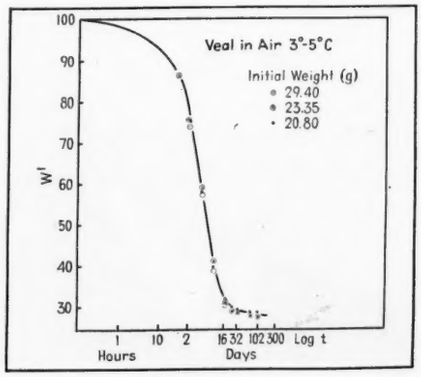


Fig. 2

* The research on which this article is based was carried out under the auspices of the Hormel Research Foundation.

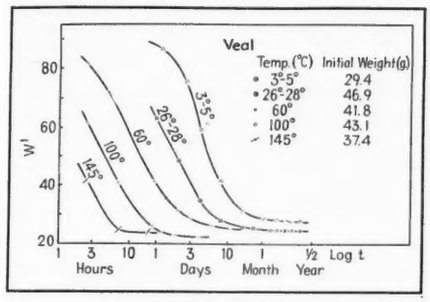


Fig. 3

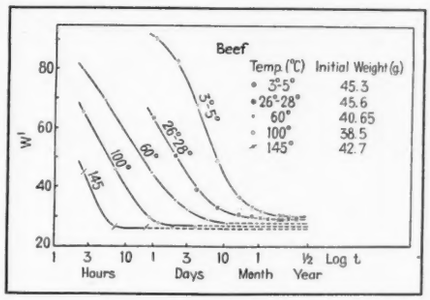


Fig. 4

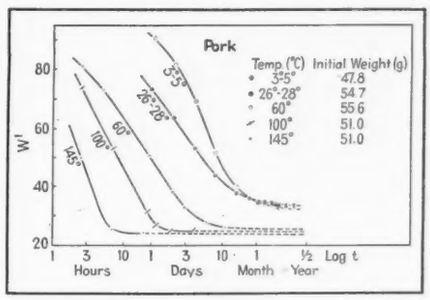


Fig. 5

can be considered as satisfactory also. For the sake of simplification, we shall base the calculated surfaces upon a density of 1.00.

Rate of Shrinking

Figures 3, 4 and 5 show the decrease of weight with time at various tempera-

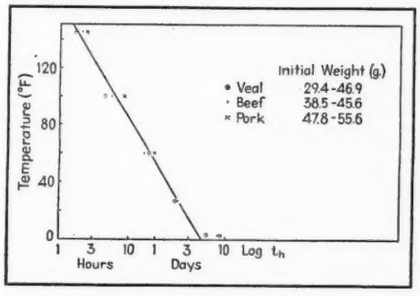


Fig. 6

TABLE II—Time of Half Values at Various Temperatures

(In relative units. Values with an asterisk are extrapolated.)

Temperature (°C)	t_h
−50	513.0*
−25	335.0*
0	100.0
25	33.0
50	16.6
100	4.0
150	0.95
200	0.48*

tures, between 3 and 145 deg. C. for veal, beef and pork. One concludes that the rate of shrinking increases enormously with temperature. Because of the asymptotic character of the curves, no exact time for the end of the weight shrinkage can be given; however, the times t_h can be determined with accuracy and can be used for expressing numerically the increase of the rate of shrinking with temperature. This is done in Fig. 6. It contains the log of the t_h values, as obtained from Figs. 3, 4 and 5, plotted against the temperature. Compiled from Fig. 6 by interpolation and extrapolation, Table II gives the results in a more general form. The time of the half value at 0 deg. C. is put equal to 100.0.

The fact that there appears to be a linear function between temperature and log t_h in a first approximation does not seem to have any deeper significance. No reason for such a simple function can be found and it is most likely that it is the accidental result, within 0 and 150 deg. C., of the superposition of several complex functions. It is interesting to note that veal, beef and pork behave quantitatively alike. (The slight differences that exist are likely to be due to differences in W_0 rather than to differences in behavior of the three kinds of meat.)

Final Shrinking

Whereas the rate of shrinking varies strongly with temperature, the final degree of shrinking varies very little with temperature. The latter is shown in Figs. 7, 8 and 9. The final W^1 values depend of course on the moisture content of the air. Those given in the three figures are valid for the low moisture content prevailing in all experiments described in this paper.

Table III summarizes numerically the results of the preceding figures. Each value is the mean of three values. The horizontal column I gives the final loss L^1_w at 3 to 5 deg. C. Column II gives the same for 145 deg. C. and column III gives the difference. Column IV finally shows that the excess loss at 145 deg. C. amounts to only 5 or 6 percent of the loss at 3 to 5 deg. C., excepting pork. If all experiments had been done in completely dry air, the percentage of this excess loss would be still smaller. Thus, taking 3 and 145 deg. C. as arbitrary temperature limits, one can say that at least 94 or 95 percent of the weight lost at 145 deg. C. would be lost at low temperature also, and hence constitutes, so to say, a temperature-independent loss. The other 5 or 6 percent represents the temperature-dependent loss.

The loss of weight consists in a loss of water and fat. The latter is appreciable only for pork. For beef, and particularly for veal, we can neglect the loss of fat in a first approximation and consider the loss found as a loss of water. (The greater amount of fat lost by pork leads to the discrepancy of the data in Table III on pork as compared to the data for beef and veal). Granting this, we can consider the temperature-independent loss as the loss of chemically "free" water, and the small temperature-dependent loss as a loss resulting from a denaturation of the proteins in meat. The latter is apparently too small to play a role in the mechanism of shrinking in air of low moisture content.

Effect of Surface Area

The water which is lost by shrinking quits the samples through the surface. This might occur through drip, i.e., by a dropping off of water droplets in a vertical direction, or it might occur by evaporation. In the latter case, the whole surface, in the former case, only certain parts of it, should play a role. In order to clear this up, a detailed analysis of the role of the surface of the shrinking samples was undertaken.

In the first series of experiments, the surface area was varied by partial coating with paraffin. Veal samples of cubical shape and of approximately the same initial weight were used. The ice cold samples were dipped momentarily into a bath of paraffin. By this procedure, a very thin and firmly adhering film of paraffin forms around all those parts of the samples which had come into contact with the bath.* Instead of being hung, the samples were kept this time resting on one of the coated faces.

Figure 10 gives some results. Curve I applies to uncoated samples, curve II is obtained from a sample with five uncoated faces, curve III holds for two samples with four uncoated faces each (two opposite faces were coated). Curve IV applies to two samples which had only two opposite faces left uncoated, and curve V holds for samples which had been coated completely. In all data, the weight and change of weight of the paraffin film are taken into account. The Figure shows that the loss of weight after a certain time is smaller

* Because of the volume shrinkage, it was necessary to renew the coating of partially coated samples from time to time.

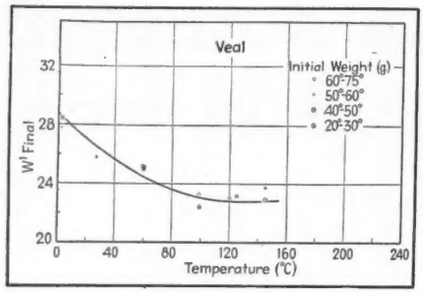


Fig. 7

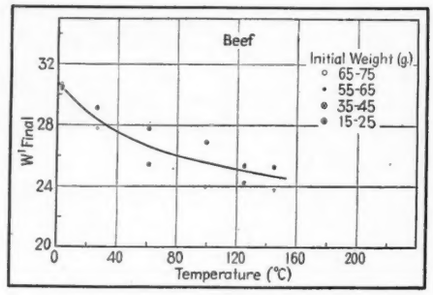


Fig. 8

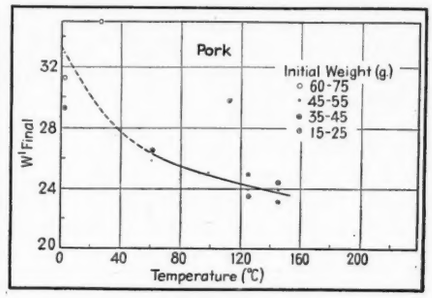


Fig. 9

the more surface is coated. Figure 11 presents the same results in a different way. It shows that

(1) $$L'_w = k\,S'_o$$

i.e., the loss of weight is at any time (as long as t is smaller than t_h) proportional to the uncoated initial surface area S'_o. The calculated values are obtained from relation (1). The magnitude of the constant k was derived from the observed shrinkage of the completely uncoated samples. A more general form in which the formula can be written would be

(1a) $$L'_w = k\,S'$$

i.e., the loss of weight is at any time proportional to the uncoated actual surface area S'.

Beside showing that the loss of water is proportional to the surface area, the results indicate implicitly that all parts of the surface are losing water at the same rate. Just as much water is lost through vertical cube faces as through horizontal ones. This favors the hypothesis that an evaporation of water from the surface is the main factor in shrinking at low moisture content of the surrounding air.

In a second series of experiments, the surface area was varied between 22 and 215 sq. cm. by varying W_o of cubical veal samples between 7.85 and 240.2 grams. Figure 12 gives the results at 3 to 5 deg. C. The samples shrink faster the smaller the initial weight.

If formula (1) is valid, then the weight shrinkage of two samples a and b of different initial weights should be governed by the relation

(2) $$\frac{L'_{w_b}}{L'_{w_a}} = \frac{S_{o_o}}{S_{o_a}}$$

This relation is tested in Fig. 13. Curve I gives the observed shrinkage of a pork sample with an initial weight of 37.05 grams. Curve II gives its shrinkage as calculated from formula (2). The sample of comparison had an initial weight of 71.1 grams. The figure shows that formula (2), and implicitly formula (1), hold well as long as t is smaller than t_h. Identical results were obtained with veal and beef.

TABLE III.

	Veal	Beef	Pork
I. Final $L'_{w(3\text{-}5)}$ *	72.4	70.8	69.7
II. Final $L'_{w(14)}$ *	76.4	75.2	76.2
III. $L'_{w(14)}$ * $-L_{w(3\text{-}5)}$ *	4.0	4.4	6.5
IV. $L'_{w(14)}$ * $-L_{w(3\text{-}5)}$ *	5.5	6.2	9.3

* Figures in deg. C.

Still another, though more restricted, relationship illustrates the important role of the surface. In Fig. 14, the time of the half value is plotted against the initial surface area for the same 12 veal samples which were considered in Fig. 12. Obviously, a relation

(3) $$t_h = k'\,S_1$$

is valid in a first approximation for surface areas up to 100 sq. cm. It can be generalized to

(3a) $$t_x = k'\,S_o$$

as long as t_x is smaller than t_h. By contrast, Fig. 15 shows that no proportionality exists between t_h and W_o. It shows also implicitly that no proportionality exists between t_h and the initial volume V_o.

In a third series of experiments, we varied the surface area by varying the shape of the samples. Figure 16 gives the results obtained with cubes, rods and disks of veal at 3 to 5 deg. C. For equal initial weights, the rate of shrinking increases from cubes to rods to disks, i.e., it is again greater the larger the initial surface area.

In Fig. 17, formula (1) is tested. Again it is found valid as long as t is smaller than t_h. After the first and second day of shrinking, the validity is complete. After four days of shrinking, the formula still holds for the cubes and rods, whereas the most strongly shrunk disks (t has approached or exceeded t_h in value) do not obey anymore the linear relation.

Moisture Loss Comparison

The results described in the preceding section are in favor of the hypothesis that the water of shrinking meat samples is lost by evaporation from the surface of the samples. A final and decisive test of this hypothesis can be made by comparing the rate at which water is lost from a meat surface with that at which it is lost from a surface of pure water. For this purpose, we calculate for cubical, rod-like and disk-like veal samples the loss of water per hour per cm.^{2} surface, as found at different stages of the shrinking process at 3 to 5 deg. C. The results are given in Fig. 18. The surface considered this time is not the initial surface S_o, but the actual surface as measured directly at various times during the progress of shrinking. The maximum loss observed is 2.9 mg. Generally, the loss remains above the 2 mg. mark as long as the loss of weight has not exceeded approximately 37 to 42 percent of the initial weight. At room temperature, the shape of the curves is the same. The maximum loss observed there is approximately 3.5 times higher than at low temperature.

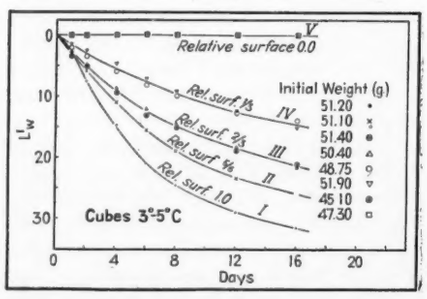


Fig. 10

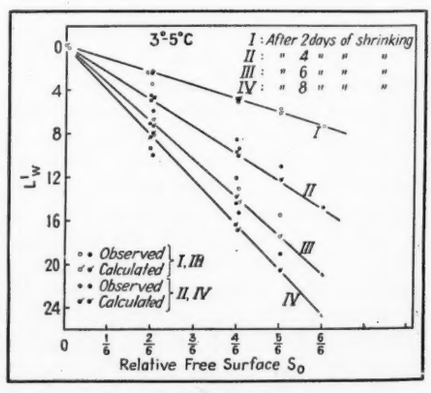


Fig. 11

The determination of the loss of water from a surface of pure water was made under exactly the same experimental conditions (temperature, moisture content of the surrounding air) as prevailed during the shrinkage of the above discussed samples of meat. Six determinations at 3 to 5 deg. C. gave a mean value of 2.43 mg. per hour per square centimeter, the maximum value being 2.88 and the minimum value 2.01. Eight determinations at 26 to 29 deg. C. gave a mean value of 8.12 mg. per hour per square centimeter, the maximum value being 9.73 and the minimum value 7.00. It may be mentioned that the evaporation was carried out in crystallizers. For the experiments at low temperature, their inner diameter was varied systematically between 5.4 and 12.2 cm. For the experiments at room temperature, it was varied between 2.95 and 12.1 cm. Thus, the surface area was varied between 6.8 and 110 sq. cm. in the latter case.

Comparing these values to those obtained above for meat samples, one arrives at the interesting result that the loss of water by a meat sample differs very little from the loss of water by pure water of equal surface area. This is true as long as the weight shrinkage of the meat samples has not progressed beyond approximately 35 percent of their initial weight. This confirms definitely the evaporation hypothesis.

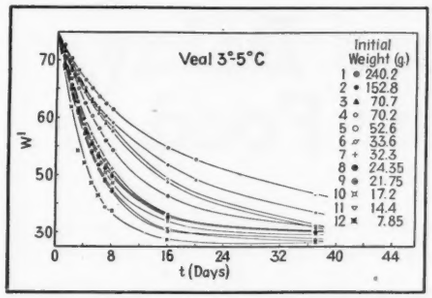


Fig. 12

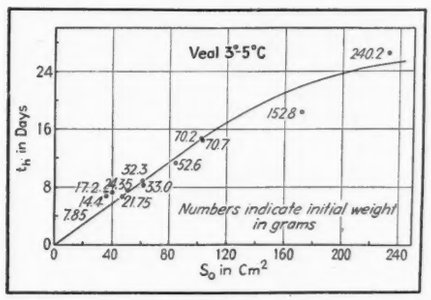


Fig. 14

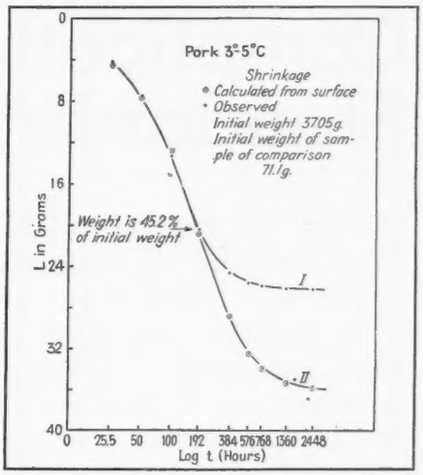


Fig. 13

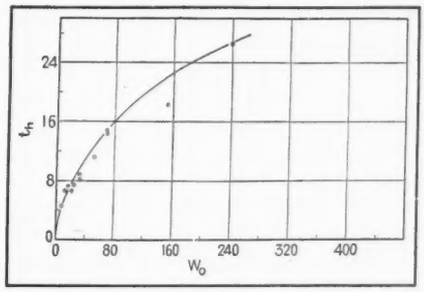


Fig. 15

Conclusions

The main result of the experiments is that the weight shrinkage of meat in air of low moisture content consists mainly in an evaporation of chemically "free" water from the surface of the samples. Per surface unit, the rate of this evaporation was found to be closely similar to that found for the evaporation of pure water from a water surface. In order to understand the latter fact, one has to assume that fresh meat samples are covered with a film of water. Furthermore, one has to assume that down to weight losses of 35 to 40 percent the existence of this film is maintained by a constant and sufficient supply of water from the interior of the samples. There is hardly any doubt that capillaries in the tissue function as supply channels. Samples shrunk beyond this limit do not seem to be covered by a continuous film of water. Further evaporation is likely to proceed from local moisture patches on the surfaces or directly from the interior of the porous samples.

One might think of several causes for explaining the transfer of water from the interior to the surface. It might be due to drip, syneresis or diffusion. Drip can be excluded as the principal factor, as explained in preceding sections of this paper. (Actually drip is involved in shrinkage in air of low moisture content. Its contribution to the total loss of water is so small, however, that it can be neglected in a first approximation). Syneresis is very unlikely, as shown by the following experiments. Two veal samples were coated completely with paraffin and kept for 60 days at 3 to 5 deg. C. After that time, the paraffin coating was removed. The samples had retained their initial weight and their initial volume. Only a very thin layer of moisture had formed between the samples and the paraffin "shell." Its thickness was a few microns. If there were any tendency to syneresis, one would expect such samples to contract within the paraffin coating and a noticeable amount of excreted liquid to accumulate between the contracted samples and the coating.

Transfer of water from the interior to the surface of the meat samples is most likely a process of diffusion.

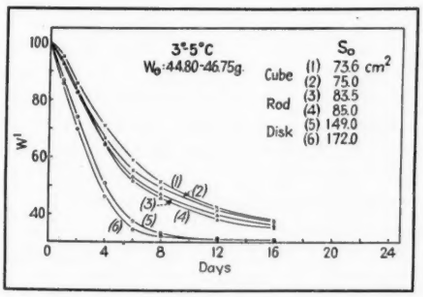


Fig. 16

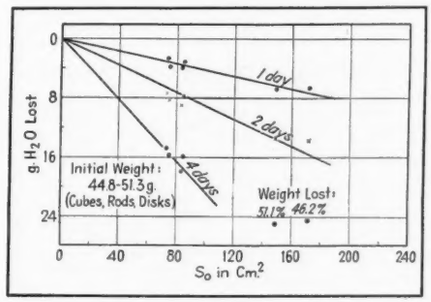


Fig. 17

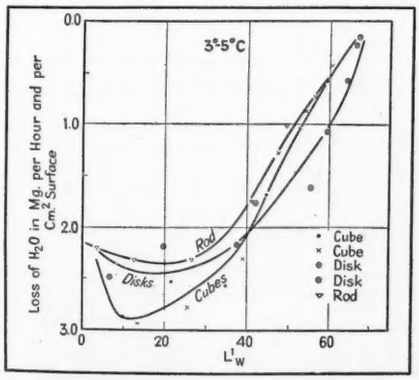


Fig. 18

Complications Delay Standards for Food

Of the 34 dockets which have come up for hearings under the F&DA, only 21 have reached the stage of final standards. Average time required to fix a standard is 10 months. This survey of the Washington situation gives reasons for past delay and shows future prospects

FOOD standards had their third birthday on December 15, 1941, anniversary of the first announcement in the *Federal Register* of Food, Drug, and Cosmetic Docket No. 1. As 1942 began, Docket No. 34 was just coming up for initial hearing. However, only 21 of these Food and Drug Administration dockets had reached the stage of final standards. Table I shows the list of foods which have been standardized.

There are now in process standards for about another dozen foods, as shown in Table II. This represents capacity operation of the Food and Drug Administration staff of presiding officers, counsel and technical experts. Status of these dockets is shown in Table V.

In February of 1939, there was an announcement of exemption from label declaration of ingredients of 24 foods pending the promulgation of definitions and standards of identity for those foods. Later, ice cream and related products and nonalcoholic carbonated beverages were added to this exemption list. (See FOOD INDUSTRIES, March '41, page 81). Seven of these standards have been completed, but five of the seven are now being either appealed or amended. Five more of the exemption list are now in process and the rest have not yet been started. Table III shows the list of foods for which standards are to be promulgated but have not yet been started. Other dockets will, of course, be added to this schedule as fast as the Food and Drug Administration staff is able to handle the work.

Six months was the average time required from the initial hearing date of these first dockets to the date of the final promulgation of a standard. This figure includes, however, the four speedy coal-tar color dockets and the five dockets which were merely amendments. A more representative average figure for the time required to fix a standard is ten months. At present, cream cheese holds the record (27 months) for longest time elapsed between hearing and promulgated standard. The hearings began on October 2, 1939, and a standard had not yet been announced by January 1, 1942.

Since 30 days' notice is required before the initial hearing and since the effective date of a new standard may not be less than 90 days after promulgation, at least another four months is added to the time required for creating a standard. This raises the average up to 14 months for those principal food standards so far established.

Much of the time required is in the digestion of the hearing record by the presiding officer. Briefs are filed by opposing and supporting counsel, and findings of fact and a proposed order must be drafted for issuance by the Federal Security Administrator. When the record of the hearing runs over a thousand pages, as many of them have (the bread hearing record was 4,163 pages long), this represents a considerable length of time. The tentative order must be reconsidered after all interested parties have had an opportunity to comment on it, and a final order is then issued. This interval alone has averaged over two months for each standard.

The hearing itself may be prolonged over quite a period. In the first place, when a food is to be standardized by the Food and Drug Administration, a proposed standard is drafted and a hearing announced. At the hearing anyone who classifies himself as an "interested party" may ask questions or testify. By such procedure, the Administration gives everyone equal opportunity to assist in the making of a standard.

Since use of any ingredient in a standardized product depends on its specific inclusion in the standard for that product, anyone who wishes to supply that ingredient must see that there is a full exposition of his claims in the record of the hearing. Composition of his ingredient, reasons for its use and effect on the consumer are searchingly questioned. Cost factors are also brought out in many cases.

Direct testimony, cross examination, rebuttal, and re-cross examination of witness after witness accounts for the length of these standards proceedings. Before the bread hearing began early in July, one of the bakers' representatives anticipated that two or three days would be necessary for the hearing. Food and Drug Administration officials were more realistic and anticipated that "two weeks, or possibly three' would be necessary. One cynical Washington observer, however, forecast Labor Day as the final adjournment. Actually his estimate was the closest. Table IV, a time-summary of the bread hearing, shows how this came about. Manufacturers of all complicated foods can anticipate comparable experience at future standards hearings, for example carbonated beverages, ice cream and possibly flavoring extracts.

TABLE I—Standardized Foods.

Standards of identity have been promulgated by the Food and Drug Administration since 1938 for the following foods, as of January 1, 1942:

Apricots, canned [1, 2, 3]
Cheeses; chedder, colby and washed curd
Cherries, canned [1, 2, 3]
Coal-tar colors
Cream; heavy and light
Cream, whipping; heavy and light
Dietary foods (labeling regulations only)
Egg yolks; liquid, frozen and dried
Eggs, whole; liquid, frozen and dried
Flours and related products [3]
Fruit butters, jellies and preserves [3]
Milk, condensed; plain and sweetened
Milk, evaporated
Milk, dried skim
Oleomargarine [3]
Peaches, canned [1, 2, 3]
Pears, canned [1, 2, 3]
Peas, canned [1]
Tomato catsup
Tomato juice
Tomato paste
Tomato puree
Tomatoes, canned [1]
Vegetables, canned [4]

[1] Standards of quality and fill of container have also been established for these foods.

[2] An amendment to this standard is being formally considered; see text.

[3] A court appeal has been made in respect to certain details of this standard; see text.

[4] "Vegetables" include artichokes, asparagus, bean sprouts, green and wax beans, shelled beans, lima beans, beets, beet greens, broccoli, brussels sprouts, cabbage, carrots, cauliflower, celery, collards, white and yellow or golden corn, field corn, dandelion greens, kale, mushrooms, mustard greens, okra, onions, parsnips, black-eyed peas, field peas, green and red sweet peppers, pimientos, potatoes, sweet potatoes, rutabagas, salsify, spinach, Swiss chard, turnip greens, turnips and truffles.

TABLE II—Standards in Process.

Dockets covering the following foods have been announced and were at various stages of completion on January 1, 1942. For example, the initial hearing had not yet been held for ice cream.

Apricots, canned [5]
Breads
Cheeses: cottage, cream, and Neufchatel
Cherries, canned [5]
Chocolate: coatings and liquor
Cocoas and cacao nibs
Fruit cocktail, canned
Ice cream and related products
Macaroni and related products
Peaches, canned [5]
Pears, canned [5]

[5] Amendments to standards already promulgated.

TABLE III—
Foods to be Standardized.

Each of the following commodities has either been exempted from label declaration of ingredients by an order of February 1, 1939 (see text); or has since been announced as the subject of informal consideration for a definition and standard of identity. Also rumored but not yet announced up to January 1, 1942, is a docket which will consider standards limiting toxic spray residues.

Carbonated beverages, nonalcoholic [6]
Citrus fruits
Clams, canned
Extracts; lemon, orange and vanilla
Fish roe, canned
Fruits, unmixed, canned [7]
Grape juice
Grapefruit juice
Malted milk
Mayonnaise dressing
Olives in brine
Orange juice; plain and concentrated
Oysters; canned and shucked
Rye flour
Sauerkraut
Shrimp, canned (dry and wet pack)
Soybean flour

[6] Exempted by an informal ruling.
[7] Other than apricots, cherries, peaches, and pears, for which standards are in process.

TABLE IV—
Time Summary of Bread Hearing.

(July 7 to August 15, 1941)

	Days [1]
White bread	
Government presentation	1
Ingredient suppliers	
Shortenings	2
Milk	1¼
Malt sirup, etc	¼
Corn flour, etc	1
Molasses	1½
Corn sirup, dextrose	¼
Sucrose	¼
Dough conditioners	1½
Rope and mold control	3½
Buttermilk	¼
Bakers' presentation	¼
Consumers (all kinds of bread)	½
Government rebuttal	1½
Industry rebuttal	2
Total	17
Milk, bread, cream bread and butter bread (All presentations combined)	2
Egg bread	¾
Honey bread	1¼
Butter and egg bread and milk and honey bread	⅛
Raisin bread	⅛
Whole wheat bread	½
Enriched bread	
Government presentation	½
National research council [2]	1¾
Ingredient suppliers	
Milk	¼
Flour	¼
Bakers' presentation	¼
Rebuttal	½
Total	3½
Grand total (not counting week-ends or a three-day recess)	25¼

[1] A typical day is a 6-hour session, 9:30 to 12:30 and 2:00 to 5:00.
[2] National Research Council Committee on Food and Nutrition.

Mention has been made of the long time required to create a standard for cream cheese. In part, at least, this delay has been occasioned by the drop in fat content over recent years, made possible by use of various gums to hold water in the cheese. Food and Drug officials can't reconcile this practice with their philosophy of what a standard food should be. Rather than arbitrarily dictating a standard, however, repeated efforts have been made to reach an amicable settlement of the conflicting views. The result has been a considerable delay.

Unfortunately, some of the standards which have been promulgated have not been immediately accepted. A number of them have given rise to court appeals. Notable among these is the Cane Sugar Refiners Association appeal for relief from the provisions of the standards of identity in regard to sweetening agents used with canned apricots, cherries, peaches and pears. Principally as a result of this appeal, the canned fruits standard was reopened by F&DA in August, 1940, for reconsideration.

A tentative order on the canned fruits docket issued on January 8 provides that up to certain limits mixtures of sucrose, dextrose, corn sirup and corn sirup solids may be used without label declaration. If sustained in the final order, this will in effect supersede the Hyde and Wallace rulings.

The jam and jelly standards are among those which will be affected by the sugar decision, when it comes. Both the Cane Sugar Refiners Association and the Corn Industry Research Foundation have appealed for relief from the sweetening agent requirements in jams and jellies. Since these appeals are in different courts, consolidation of the two cases is not likely. At present both are in a state of suspense pending the outcome of the canned fruit rehearing.

The oleomargarine standard has been

TABLE V—Schedule of Current Action on Food Standards.

*(Dockets 1 to 11, 13 to 20, and 22 have been completed and dropped from this table)**

	Docket Number and commodity	Type of Standard or regulations	Presiding Officer	A First announced in *Fed. Register*	B Initial hearing date	C Preliminary briefs due not later than	D Tentative order published in *Fed. Register*	E Final order published in *Fed. Register*	F Effective date of order
12	Cream cheese	Identity	W. G. Green, Jr.	Aug. 22, '39	Oct. 2, '39 [1]	Feb. 5, '40 [2]	Oct. 2, '40	(1)	.....
21	Flours [3]	Identity	A. W. Willcox..	Aug. 3, '40	Sept. 9, '40 [2]	Dec. 17, '40	April 1, '41	May 27, '41 [3]	Jan. 1, '42
23	Canned fruits	Identity [4]	M. F. Markel..	Aug. 17, '40	Sept. 16, '40	Dec. 11, '40	.....	.....	.....
24	Dietary foods	Label statements.	M. F. Markel..	Sept. 5, '40	Oct. 7, '40	Nov. 25, '40	July 8, '41	Nov. 22, '41	May 17, '42
25	Oleomargarine	Identity	E. B. Williams.	Oct. 11, '40	Nov. 18, '40	Jan. 6, '41	April 17, '41	June 7, '41	Sept. 5, '41
26	Chocolate Products [5]	Identity	M. F. Markel..	Oct. 19, '40	Dec. 9, '40	July 1, '41	.....	.....	.....
27	Fruit cocktail	Identity, quality and fill of container	M. F. Markel..	Dec. 11, '40	Jan. 13, '41	Feb. 8, '41	.....	.....	.....
28	Canned fruits [6]	Quality	M. F. Markel..	Dec. 11, '40	Jan. 16, '41 [7]	.....	.....	.....	.....
29	Neufchatel and cottage cheeses	Identity	W. G. Green, Jr.	Jan. 30, '41	April 21, '41 [8]	June 30, '41	.....	.....	.....
30	Habit forming drugs	General regulations	M. F. Markel..	Jan. 30, '41	Mar. 3, '41	May 1, '41	Nov. 15, '41	.....	.....
31	Breads, rolls or buns [9]	Identity	A. W. Willcox..	June 7, '41	July 7, '41	Oct. 20, '41 [2]	.....	.....	.....
32 [10]	.....	.....	.....	.....	.....	.....	.....	.....	.....
33	Macaroni and related products [11]	Identity	A. W. Willcox..	Aug. 29, '41 [12]	Nov. 3, '40 [13]	Jan. 15, '42 [2]	.....	.....	.....
34	Ice cream and related products [14]	Identity	T. C. Billig....	Nov. 1, '41	Jan. 5, '42 [15]	.....	.....	.....	.....

* Docket 1 pertains to tomato products, 2 to canned tomatoes, 3 to eggs and egg products, 4 and 9 to coal tar colors, and 5 to canned peaches, appricots pears and cherries. See FOOD INDUSTRIES, October 1939, page 569; January 1940, page 70; and February 1940, page 73, for data on these standards, Docket 6 pertains to canned peas; 7, cream and milk; 8, canned vegetables; 10, fruit jams, jellies and butters; 11, cheddar cheese, washed curd cheese and colby cheese; 13 and 14 coal tar colors; 15, dietary foods (cancelled); 16, canned tomatoes; 17, flours (cancelled); 18, canned asparagus; 19 and 20, canned cherries; 22, tomato catsup. See FOOD INDUSTRIES, September 1940, page 66; and December 1940, page 90, for data on these dockets.

[1] Hearing reopened on April 21, 1941, by order in *Federal Register*, March 11, 1941. Combined with Docket No. 29.

[2] Time extended from earlier date previously announced.

[3] During course of hearing, five new sections were added to this docket and all sections were renumbered as follows: 21-A, plain flour; B, enriched flour; C, bromated flour; D, enriched bromated flour; E, durum flour; F, self-rising flour; G, enriched self-rising flour; H, phosphated flour; I, whole-wheat flour; J, bromated whole wheat flour; K, whole durum wheat flour; L, crushed wheat; M, cracked wheat; N, farina; O, enriched farina; P, semolina.

[4] Amendment to orders published in *Federal Register*, Dec. 22, 1939, and Jan. 9, 1940. (All parts of Docket No. 5.)

[5] Including cacao nibs; chocolate liquor; sweet chocolate (coating); skim milk chocolate (coating); buttermilk chocolate (coating); mixed milk, skim milk, buttermilk, malted milk chocolate (coating); cocoa; breakfast cocoa; low-fat cocoa; sweet cocoa and fat (other than cacao fat) coating; and sweet chocolate and fat (other than cacao fat) coating.

[6] Amendment to docket No. 5, Parts I, II and III, orders of Dec. 22, 1939, and Jan. 9, 1940.

[7] Hearing has been indefinitely postponed. See announcements in *Federal Register*; February 28 and March 25, 1941.

[8] Postponed from March 17, 1941, by order in *Federal Register*, March 11, 1941.

[9] There are 12 sections of this docket, as follows: 31-A, bread, rolls or buns; B, enriched bread, rolls or buns; C, milk bread, rolls or buns; D, cream bread, rolls or buns; E, butter bread, rolls or buns; F, egg bread, rolls or buns; G, honey bread, rolls or buns; H, butter and egg bread, rolls or buns; I, milk and honey bread, rolls or buns; J, raisin bread, rolls or buns; K, wholewheat bread, rolls or buns; L, bread, rolls or buns made with mixtures of flour, whole-wheat flour, cracked wheat, crushed wheat.

[10] Not yet announced.

[11] This docket includes macaroni, spaghetti, vermicelli, macaroni products, noodles, egg noodles, noodle products, egg noodle products and egg macaroni products.

[12] Corrections published in the *Federal Register* of August 30 and of October 3, 1941.

[13] Postponed from September 29, 1941, by notices in *Federal Register* of September 25 and of October 3, 1941.

[14] This docket includes ice cream, frozen custard, sherbert, water ices and related foods.

[15] Postponed from December 1, 1941, by notice in *Federal Register*, November 19, 1941.

appealed by butter manufacturers, and the standards of identity for farina and enriched farina are not satisfactory to one of the principal manufacturers. No court decision had been announced on these appeals up to January 1.

Appeals have also been made on the name "dried skim milk" and on the use of corn sirup in sweetened condensed milk. The former appeal was denied, but rumors persist that further action is to be taken. The latter appeal has been answered by an amendment stating that the hearing record did not justify inclusion of corn sirup in the standard as an optional sweetening agent. However, at the request of the appellant, the hearing will be reopened as soon as possible to consider data on corn sirup use in sweetened condensed milk.

The Food and Drug Administration has appointed a Food Standards Committee of state and federal officials. The duties of this Committee are threefold: It advises the Administration as to what commodities should be standardized; it suggests the scope and content of the standards; and it occasionally holds open meetings to educate the Committee and to discuss matters with the industry and consumer representatives. Although informal in character and without binding effect on the Administration, the work of the Committee is important and technically valuable.

With the change from a peace-time to a defense and then to a war-time economy, many of the habits of the nation will necessarily be changed. However, the present food standards program will be continued as long as possible. By so doing, new standards will further safeguard the quality of civilian supplies as well as those foods purchased by the Army, Navy and Lease-Lend consumers.

Brief Summaries Of AMS Standards

For the convenience of those who control quality in the food industries, the following digests have been prepared of the standards issued by the Agricultural Marketing Service.

ABSTRACTS containing the principal requirements of the standards issued by the Agricultural Marketing Service of the U. S. Department of Agriculture are prepared by FOOD INDUSTRIES. Those that follow and those appearing in the August, September, October and November issues continue the series started in 1940.

The complete text of the standards can be obtained from the AMS, located in Washington, D. C.

Canned Spinach (And Other Greens)*

Tentative

THE STANDARD of identity for canned spinach promulgated under Sec. 401 of the Federal Food, Drug and Cosmetic Act of June 25, 1938, is hereby adopted for the purpose of these grades.

U. S. GRADE A or U. S. FANCY canned spinach possesses a practically uniform typical green color, is practically free from defects, is tender, is free from objectionable or off flavors of all kinds, and scores not less than 85 points when scored according to the scoring system outlined herein.

U. S. GRADE C or U. S. STANDARD canned spinach possesses a fairly uniform typical green color, is fairly free from defects, is fairly tender, is free from objectionable or off flavors of all kinds, and scores not less than 70 points.

OFF-GRADE canned spinach is canned spinach that fails to meet the requirements of U. S. GRADE C or U. S. STANDARD.

The container shall be filled with spinach as full as practicable without impairment of quality. The product and packing medium shall occupy not less than 90 percent of the total volume capacity of the container. The minimum drained weights in the can sizes commonly used in packing canned spinach are shown in a table in the standards.

The grade of canned spinach may be ascertained by considering, in addition to the foregoing requirements, the following factors: Color (30 points), absence of defects (40 points), and tenderness and texture (30 points). The relative importance of each factor has been expressed numerically on a scale of 100. The essential variations within each factor are so described that the value may be ascertained for each factor and expressed numerically.

The factor of absence of defects refers to the freedom from grit, seed heads, crown and root stubs; from leaves damaged by mildew, insect, or other injury; and from harmless extraneous vegetable material (such as grass blades or small weeds). "Grit" (or sand) is rough, hard particles of earthy sediment.

The factor of tenderness and texture refers to the condition and structural characteristics of the spinach leaves and stems. The degree of coarseness or stringiness of the stems and vascular system and the tendency of the leaves to break apart, to become shredded, or to disintegrate, so that the characteristic forms of the leaves are lost, are considered under this factor.

ISSUED: Oct. 17, 1941.
EFFECTIVE: Dec. 1, 1941.

* These grades have been so drafted that they may be used in grading other greens such as canned turnip, mustard, and beet greens, and canned kale. In grading these products, however, the typical characteristics of the vegetable shall be considered.

Dried Apricots

(Final)

DRIED APRICOTS are prepared from properly matured apricots which have been properly halved and pitted and sulphured sufficiently to retain the characteristic color. The greater portion of moisture has been evaporated, and the apricots are so processed as to cleanse the fruit adequately.

Sizes of dried apricots are as follows: No. 1 size (extra fancy size)—1¼ in. in diameter, or larger. N. 2 (fancy)—1⅛ to 1¼ in. in diameter. No. 3 (extra choice)—1 to 1⅛ in. in diameter. No. 4 (choice)—13/16 to 1 in. in diameter. No. 5 size (standard size)—less than 13/16 in. in diameter. Certificates of grade shall indicate the size or combination of sizes found upon examination.

No. 1 and No. 2 size dried apricots shall contain not more than 26 percent by weight of moisture (water) and all other sizes shall contain not more than 25 percent by weight of moisture.

U. S. GRADE A dried apricots are dried apricots of similar varietal characteristics; are thick meated; and possess a reasonably uniform color. The predominating color is a good color characteristic of dried, properly matured fruit. Not more than 7 percent by weight of the halves of dried apricots are damaged

(Turn to page 97)

MATERIALS

Shortage of Fats and Oils Seen This Year • Shorts on Shortages

What War Has Done to Fats and Oils Supply

By GORDON W. McBRIDE
Chemical Engineer, Washington, D. C.

War-blocked sea lanes to the Far East, and shortage of bottoms needed for imports of fats and oils from other overseas areas, threaten a tight situation in food fats and oils. What the United States food processor and the domestic consumer can reasonably expect as an edible fats and oils supply in 1942 is set forth in this article

WARFARE in the Pacific has intensified all fats and oils problems, felt to be critical even before the Japanese attack. Both British and American supplies of many important oils have been cut by the outbreak of war in the Malaya-Philippines-Netherland Indies area. The first thought is of the soap and drying oils (coconut and tung), but any shortage of these oils will quickly back up into the supply of food fats and oils commonly used. If the supplies of the United States alone had been reduced, the problem would be serious; the additional load on domestic food industries occasioned by Lease-Lend feeding of Britain and other nations will still further aggravate the situation. The immediate program of Lease-Lend food shipments calls for increased food production to feed another 20 million people, or about 15 percent more than the population of the United States alone. The probable limit of expansion in the Lease-Lend program is 50 percent above the normal United States requirements.

Domestic consumption of primary fats and oils in 1941 unquestionably set a new record. Official estimates were around 11 billion pounds when this was written, compared with 9½ billion in 1940. Typically, 70 percent of the fats and oils used in the United States goes into foods, another 20 percent into soap, and 5 or 6 percent into paints and varnishes.

The demand for the drying oils in 1942 will be considerable in the fifty-six billion dollar armament program, and at the same time will shrink very little in normal civilian fields. (Only 15 percent of all paint jobs are on new construction in normal times; 85 percent of all paint consumption is for repainting, a maintenance demand that will be strong even in wartime.) The demand for the soap oils will probably increase in the coming months with increased national income, and the demand for food fats and oils will also grow considerably, keyed as it is to buying power. Although this factor of greater national income and buying power will probably disappear as the nation moves into a war economy during 1942 and the years ahead, the immediate prospect is for increased demand for all fats and oils of the order of 10 or 15 percent above the 1941 consumption figures.

The lost imports amount to about 10 percent of our total supply. Domestic production must be increased in 1942 to supply both the increased demand and the decreased imports. Depletion of stocks is certain unless domestic production is increased about 15 percent over the 1941 figure.

Fortunately, Philippine imports of copra and coconut oil were routed to the West coast of the United States early in 1941 instead of continuing to Eastern and Gulf ports as usual. The effect of this transportation change was to bring in more copra and coconut oil per month with a given number of ships and to build up stocks somewhat. However, when the war broke out, coconut oil stocks were not sufficient to last for more than a few months. (See Table I.)

Soybean production in 1941 set a new record at about 110 million bushels. The previous record was slightly over 91 million bushels in 1939. Despite this record output, the price of soybeans in 1941 reached the highest figure since the 1920's, when soybeans were produced mainly for seed. Production goals for 1942 call for an 18 percent expansion in soybean acreage to be harvested for crushing. This acreage will be double the 1936–1940 average, so only a crop failure could prevent another new record this year.

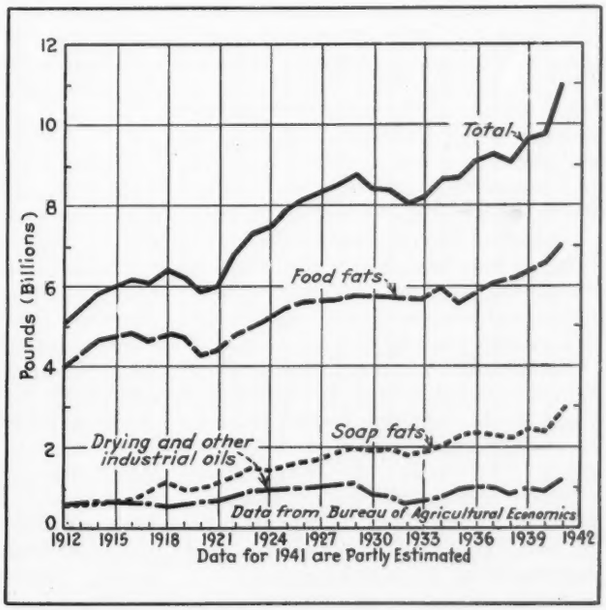


CHART I—Domestic disappearance of primary fats and oils, crude basis, by groups, in the United States, 1912-1941.

Peanut oil production during 1941 was also at a new record. Demand for edible oils, however, accounted for all of this oil and prices continued strong. Peanut acreage in 1942 would be expanded by about 1½ million acres above the 1941 planting, also nearly doubling the 1936–40 average acreage. This combined peanut and soybean acreage increase will produce, with normal crop yields, about 500 million pounds more oil than the 1941 harvests.

The Surplus Marketing Administration was also active in 1941 in stimulating the manufacture of soy flour and peanut flour. The purpose was to produce concentrated and relatively nonperishable fat and protein foods for shipment to overseas consumers, whether Army or Navy or Lease-Lend. Although this type of product tends to compete with the fats and oils for raw materials, a hundred million pounds of these flours would contain less than 20 million pounds of oil.

More Lard This Year

Lard production in 1941 was about 2.2 billion pounds, or down about 5 or 10 percent from 1940. The 1942 goal for hog production for slaughter is 79 million hogs. Assuming a yield of lard of 30 lb. per hog, this would amount to nearly 2.4 billion pounds of lard produced, or nearly a 35 percent increase over the 1936–40 average.

Despite the slightly smaller production last year, stocks of lard and rendered pork fat reached a record high of about 383 million pounds in mid-1941. Lease-Lend shipments considerably reduced that figure in the last six months of 1941, and a technic was developed for use of lard as a refrigerent in boats which do not have refrigerated cargo space—(see FOOD INDUSTRIES, January, 1942, page 77). This foreshadows a large export of lard in the coming months, when shortage of equipment and containers for processed foods in this country will necessitate more shipments of perishable foods to Britain. Anticipating the demand, both as refrigerant and food, lard was withdrawn during the fall from the surplus list of food products distributed under the food stamp program.

On October 24, the Department of Agriculture announced plans for the purchase of cottonseed-oil shortening for distribution through various programs. The Surplus Marketing Administration sent announcements to manufacturers asking them to submit offers of sale. However, no purchases had been made up to early January.

Butter production did not increase in proportion to the demand for fats and oils. This was due principally to the fact that other manufactured dairy products were in even greater demand than the butter. Diversion of milk to cheese, evaporated milk and dried milk, principally for shipment to England under the Lease-Lend program, accounted for most of the slightly increased milk production in 1941.

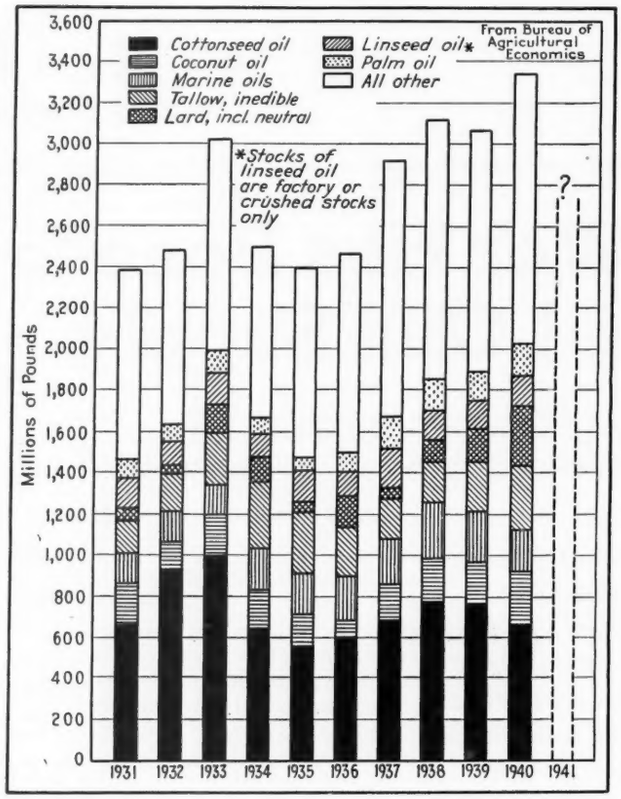


CHART II—Fats and oils stocks in the United States, as of December 31, 1931 to 1940. Note that "all other" includes shortenings, other miscellaneous processed oils, and crude oil equivalent of seeds, nuts and similar materials, all in storage. The figures given for cottonseed oil, coconut oil and linseed oil are oil stocks only and do not include oil equivalents of cottonseed, copra and flaxseed in storage.

Flaxseed Production

A near-record production of flaxseed (about 31 million bushels), combined with large stocks of Argentine flaxseed and a 3-million bushel surplus in Canada, is one of the few comforting factors in the present fats and oils situation. There has been enough linseed oil so that some has even gone into soap production. Shortages of tung and perilla oils, however, will increase the demand for linseed oil. Continued high production of flaxseed is anticipated, although the 1942 acreage goal has not been set above the 1941 level. Duty on flaxseed was cut in half to 32½ cents per bushel as a result of the Argentine trade agreement, effective November 13. The rate will increase to 50 cents after the war, but in the meantime this factor should aid somewhat the moving of South American supplies into the United States.

Domestic castor bean production will unquestionably be stimulated. The seed planting program begun in mid-1941 will be pushed to the limit. Reluctance to raise castor beans might easily be overcome with Federal financial aid if the only difficulty is a cost that is too high to compete with the imported beans. Present philosophy of government planning is to get all desired production at the lowest possible cost, but to get the maximum production regardless of cost.

Brazilian production of castor beans, babassu nuts, and oiticica nuts and their import into the United States will be increased as much as possible. With the Far Eastern oils cut off, this Western Hemisphere supply will be more than welcome in the 1942 production program.

The food man may wonder how this linseed and castor and other drying oil production will help him: He should realize that for every pound of these drying oils produced or imported, at least one pound of soybean oil (to name but one) is not needed for making paint. Thus the food manufacturer benefits by having paint oils more abundant.

Government Control

Government control of fats and oils was well established by the end of 1941. It began with export license control, effective April 15. Glycerine exports had already been under this control for some time.

The next step in control was a warning by the Office of Price Administration on June 27 that a price ceiling might be established. This warning came after a six-month period of rising prices during which fats and oils prices rose about 50 percent. The rate of price rise then slowed up for the last half of the year, in spite of the fact

that a statement made late in August removed implications of a ceiling "unless a run-away market should develop."

After the outbreak of war on December 7, prices immediately jumped. The Office of Price Administration acted within a week and set a temporary price ceiling based on prices of November 26. On December 31, this price ceiling was modified "to conform with intent of Congress" to require that no agricultural ceiling could be fixed below October 1 market prices.

In effect, this order raised the price ceiling at least 11 percent from the original announcement. Special provision was "made for soybean oil and linseed oil and for other fats and oils the prices of which were below their normal relation to the price of cottonseed oil on October 1, 1941." Except for butter, essential oils and mineral oils, the new ceiling covers all raw, crude and refined fats and oils and their byproducts and derivatives, as well as greases. Specifically excluded are sales of fats and oils products in the finished form; sales of refined fats and oils—except olive oils—through wholesale and retail channels; sales directly to the baking, restaurant, hotel and other cooking trades; and sales of lard designed for human consumption without further processing.

Prices of fats and oils thus increased nearly 75 percent during the year 1941. Several factors contributed to this rise: Domestic demand was strengthened as a result of increased industrial activity and increased consumer incomes; lard production was a little lower in 1941 than in the preceding year; shipping costs for imported oils were higher and volume of imports was smaller during the first half of the year; and government purchases of lard and butter were made to "support" the market. As a result, fats and oils entered 1942 about 25 percent above the 1927–29 price level.

Further control of the same fats and oils covered by the OPA order was established by the priorities division (OPM) order forbidding any manufacturer or processor from buying more than 90 days' supply. The order, issued on December 29 and effective immediately, also prohibits any delivery of the affected products in excess of 90 days' operating supply.

Price ceilings have also been set for glycerine by an OPA order.

Shortages Ahead

In spite of price and supply controls, shortages of one kind of oil or another will be felt within the year ahead. The interchangeability of oils will thus be put to a very practical test. If crop yields are normal in 1942, domestic production of fats and oils will be just adequate for the indicated demand. If, by good fortune, bumper crops are obtained or the expected demand does not materialize, a surplus of fats and oils above domestic needs will develop, but this will be more than absorbed by Lease-Lend demands. A surplus of food fats for feeding the war-torn nations would be of great value when the United States is sitting at a conference table, helping to write the peace. Certainly, world need will exceed supply for some time to come.

TABLE II—Imports of Foreign Fats and Oils.

(*Including oil equivalent of seeds, nuts, etc.*)

Import statistics for the entire year 1941 will not be released until after the war, so the following 9-month figures will be the the last ones available for an indefinite period. (Domestic production and consumption statistics are normally available about February 1, too late for presentation with this year-end review.) Note that over half the tonnage of imported oils is coconut, perilla, palm and tung, all of which come principally from the present war zone in the Far East.

	1939 12 m.	1940 [1] 12 m.	1941 [1] 1st 9 m.
	(Millions of pounds)		
Babassu oil	72	63	36
Castor oil	73	107	131
Coconut oil	608	759	573
Cod-liver oil	50	16	9
Corn oil	14	[2]	1
Cottonseed oil [3]	29	12	4
Linseed oil	305	225	216
Oiticica oil	19	16	30
Olive oil (edible)	63	50	8
Olive oil (inedible)	39	30	5
Palm oil	289	225	223
Palm kernel oil	6	13	6
Peanut oil	4	3	?
Perilla oil	51	11	5
Rape oil	12	15	16
Sesame oil	9	7	3
Soybean oil	4	5	1
Teaseed oil	5	4	1
Tung oil	79	97	26
Whale oil	20	22	2
Animal fats and oils [4]	10	7	23
Fish oils [4]	17	4	11
Vegetable fats and oils [4]	37	16	32
Totals	1,815	1,707 [1]	1,364 [1]

[1] Preliminary.
[2] Less than half a million pounds.
[3] Almost all of this is refined oil.
[4] Not otherwise specified.

TABLE I—Our Stock Piles of "Strategic" fats and oils

Part A of this table shows the quantities of fats and oils reported by the Bureau of the Census as factory and warehouse stocks on the indicated dates. Oil content of raw materials is included in the calculations. Only those oils are included which are imported in significant quantities or which are relatively irreplaceable by domestic oils. Important to food manufacturers is the fact that shortage of these oils will make the soap and paint manufacturers compete for some of the domestic fats and oils normally used only by the food manufacturer. The stocks of castor oil and linseed oil on September 30, 1941 (latest data available), were 74 percent and 75 percent, respectively, of an average year's supply; all other stocks were less than 40 percent of the imports for an average year. (The average domestic production of linseed oil for the same five years was 212 million pounds in addition to the imported 320 million pounds.) Although it has been essential to the tinplate industry, palm oil is not included in this list of "strategic" fats and oils because the supply of palm oil is more than adequate for the supply of tin in the country. Furthermore, West African palm oil will probably be available in sufficient quantities to meet the reduced needs of the tinplate industry.

Part B of this table shows the average quantities of the "strategic" oils used in the last five years for which data are available, and the average stocks on hand by quarters and for the year. Note that coconut oil stocks usually decrease by about 10 percent during the third quarter. Although in 1941 an increase of about 10 percent was shown during the third quarter, the total stock of coconut oil on Sept. 30, 1941, would last only nine months if used *only* by the soap industry at the 1936–40 average rate. Since food manufacturers have been using coconut oil also, the stocks will probably be exhausted by mid-1942. If the largest recorded imports of South American babassu oil and West African palm kernel oil were again imported, approximately half the needs of the soap makers alone could be met. Food manufacturers will probably have to do without these oils for the duration.

PART A—1941 Statistics

Oils	Average imports (1936–1940)	Stocks on hand Dec. 31, '40	Mar. 31, '41	June 30, '41	Sept. 30, '41	Dec. 31, '31
		(Millions of pounds)				
Babassu oil	48	9	14	8	5	?
Coconut oil	656	301	270	227	249	?
Palm kernel oil	50	3	5	6	4	?
	754	313	289	241	258	?
Castor oil	69	31	43	46	51	?
Linseed oil	320	286	271	216	397	?
Oiticica oil	13*	...	...	...	...	?
Perilla oil	52	7	6	9	6	?
Tung oil	119	57	44	37	33	?
	573	381	364	308	487	?

* 1938–1940 average.

PART B—5-Year Average Statistics (1936-40)

Oils	Used in soap industry	Stocks on hand Dec. 31	Mar. 31	June 30	Sept. 30	Average
		(Millions of pounds)				
Babassu oil	22	5	8	9	5	7
Coconut oil	337	225	214	229	207	219
Palm kernel oil	34	13	12	14	16	14
	393	243	234	252	228	240
	Used in "drying" industries					
Castor oil	11	25	27	28	23	26
Linseed oil	329	225	226	180	296	232
Oiticica oil	...	...	...	...	...	...
Perilla oil	41	16	15	17	20	17
Tung oil	90	46	44	47	53	48
	471	312	312	272	392	323

Shorts on Shortages

Materials Situation Summarized

Men who have the entire resources of the government at their command to study the materials problems of this country have summarized certain aspects of the situation in brief language. Some of these summaries, of interest to food manufacturers, are given here. Presumably they were accurate as of early January. But the picture can change overnight, especially when someone starts to substitute one material for another in a big way. This inevitably creates new and different shortages.

Available Materials—These materials are stated to be available: Wood, cement, lignin, glass (unless glass ingredients become scarce, which is likely), ceramics.

Write your own interpretation.

Scarce Metals—Prior to the President's January 6 message there was a certain degree of optimism that enough metal would be available to permit civilian uses to be served in part, at least. Since the President's message, practically all civilian uses of scarce metals are definitely out. Washington regretfully expects many nonwar businesses will be forced to suspend for lack of materials. But we have a war to win.

Save Waste Materials—The biggest service you can do for yourself and your country is to gather all available scrap metals, and get them into the hands of scrap-metal dealers or some collection agency such as the Salvation Army. Segregate the different materials. Ditto for paper and rags. Do it in the factory. Then repeat it in your own home. Sell it or give it, but get it into the hands of those who know what to do next.

Do it today. Don't wait for tomorrow. Millions of tons of scrap materials are urgently needed right now.

Red Cabbage Short—Even red cabbage is scarce. In three weeks its price rose from $38 to $57 per ton. In one more week it went to $78 per ton, reminiscent of white cabbage back in 1916. Oldtimers recall a peak price of $200 with $80 as the going price, and grower contracts at $7.50 per ton meant absolutely nothing.

Some Chemicals Scarce—Some chemicals used in the food industries are "officially" scarce. Some are just plain scarce. Nobody will state definitely why they are that way, but you can guess why if you know your geography and your chemistry. Here are a few: Acetic, citric (also its substitute, levulinic), lactic and tartaric acids; caffeine, chlorine, dextrose, starch, ethylene glycol, glycerine, gum arabic, palm oil, coconut oil, cottonseed oil, sodium bicarbonate, vitamin A and riboflavin.

No Sugar Shortage—Sugar (sucrose) presents a complex picture. Housewives are hoarding. Government insists there is no shortage, but plans the rationing of retail dealers. Loss of Philippine sugar (one-seventh of our national supply) plus Lease-Lend demands will explain the trend.

Ships and Cocoa Beans—Cocoa beans, raw materials of all chocolate products, while in satisfactory supply today, depend on cargo space in ships. With war in the Pacific making unprecedented demand for ships on exceptionally long voyages, the possibility of keeping up African imports is problematical. Imports from South America will probably continue at current rates to insure hemisphere solidarity.

Coconut Oil To Be Short—Coconut oil is expected to be hard to get by mid-March as a result of the Japanese invasion of the Philippines. Chemists in the baking trade are actively studying satisfactory substitutes and their proper use.

Use of cellophane as a wrapping material is affected by the shortage of solvents that are used as "adhesives."

Carbon tetrachloride shortage makes it necessary to find substitute wax removers for cleaning packaging machines operating on waxed paper or waxed cartons. Light divider oil or slab oil, a deodorized petroleum product resembling kerosene, has been found satisfactory.

Fumigants of the organic chemical types such as mixtures of carbon tetrachloride with ethylene dichloride, or ethylene oxide and carbon dioxide, are hard to get and chemists are actively seeking substitutes that are available.

Tin containers are definitely "out" for a series of food products to be announced in the near future as soon as WPB can get around to doing it. Although the available supply of tin is the determining factor at the moment, the volume of steel base plate that could be saved by prohibiting its use in packing many dry foods is giving WPB some grounds for further deliberation.

National Coffee Association is doing all it can to convince WPB of the need to retain the vacuum coffee cans, but WPB thinking, expressed informally, is opposed to metal cans of any sort for coffee. It begins to look as if coffee distribution may be temporarily forced to hark back to the horse-and-buggy days —if you can remember that far back.

Burlap joins the list of scarce items under Priorities Order M-47, December 22, 1941, which requires building up of a stockpile (perhaps for sandbags) and prohibits slashing or mutilating bags on opening.

A pound of any scarce material saved in 1942 is as good as 12 lb. available in 1943 for prosecution of the war.

Urges Antifreeze Economy

SERIOUS SHORTAGE in all materials for antifreeze use threatens. The Consumers Division of OPA is urging that every automobile user employ the materials purchased with a minimum of waste. If needless losses of antifreeze occur early in the season, it may be difficult to get replacement supplies, even though alcohol manufacturers are working at about triple peacetime rate, in the aggregate. Among the suggestions of the Consumer Division are:

1. Check fan and pump belts.
2. Clean out rust scale from radiator and motor block to prevent over-heating.
3. After flushing cooling system, check for leaks. Note, particularly, bad rubber hose connections.
4. Maintain correct water level.
5. Watch engine heat indicator for signs of overheating.
6. Use adjustable type radiator cover, opening and closing it as weather dictates. With some closing a slightly smaller quantity of antifreeze may sometimes serve. But such overheating should be avoided as results from closing covers too tightly.
7. Avoid idling engine for long periods.

Much Tin Recoverable

ONE of the encouraging signs of the times is the possibility of recovering tin and steel from used tin cans. Preliminary studies suggest the recovery of 10,000 tons per year of secondary tin from this source. As an economic proposition, however, it cannot stand on its own feet. A government subsidy will be required. More can be expected on this subject in future months.

MANAGEMENT

How To Get More Miles Out of Tires—Armour Refrigerates Trucks with Ice-Salt System

What To Do About The Tire Problem

Since no new tires can be had for house-to-house trucks, dairies and bakeries operating such trucks must do everything possible to reduce wear on tires and to recondition them for additional miles. Other truck operators should do the same to aid the war economy. This article tells what to do

WHAT can we do about retail-truck tires? That is one of the most vital questions to be answered by food companies in the dairy and baking industries which have built up their businesses wholly or in part through retail routes.

This question is vital because no new tires can be purchased "to be mounted on a truck used for the transportation of commodities to the ultimate consumer for personal, family or household use" after January 5, 1942, and until further notice in accordance with the plan of the Rationing of Tires ordered by the Office of Price Administration and effective as of that date.

No prohibition of the use of present truck owners' stocks of new or used tires on hand is mentioned in the rationing plan. Nor is there any restriction placed on the retreading or recapping of tires. However, the assumption in the trade is that when the present stock of the retreader or recapper is exhausted, no new supply will be available.

The answer to the question of what can we do about retail truck tires therefore seems to simmer down to these factors:

1. Conserve the tires in present use to the greatest possible extent.

2. Retread, recap and repair tires in present use when sufficiently worn.

3. Retread, recap and repair the used tires now in stock and have them ready.

There are many things which the management of a milk or bakery company delivering house-to-house can do to conserve tires. These include the following:

Analyze all the existing routes and determine if two routes can be combined, without overloading the truck or overworking the driver, to give a total mileage less than that for the two existing routes.

Eliminate Sunday milk deliveries if this is not already being done.

Consider the possibilities of making deliveries on five instead of six days a week, or even three days a week—Mondays, Wednesdays and Saturdays.

Consider the reduction of the area of deliveries, cutting off the outer ends of routes where the density of deliveries may be low.

Consider the possibilities of exchanging customers between companies in accordance with the greatest density of delivery by each company.

Don'ts for Drivers

Instruct the retail truck drivers NOT to:

1. Take a truck out of the garage with a "soft" or under-inflated tire. Figures prove that if a tire with a recommended air pressure of 30 lb. is run with a pressure of 21 lb., only 48 percent of the tire's normal mileage is obtained.

2. Make "jack rabbit" starts or "cowboy" stops. Quick getaways and sudden stops grind off the tread.

3. Make "fire engines" out of their trucks. Excessive speed is the greatest thief of tire mileage. An increase of 10 miles per hour from 40 to 50 miles may result in obtaining only 60 percent of the tire's normal mileage.

4. Run over obstructions on the road, such as stones. Doing so may result in side-wall bruises which reduce tire life.

5. Back into or head into curbs at high speed. Doing so causes side-wall bruises.

6. Run with broken cross chains when tire chains are used. Repair cross chains immediately with "monkey links."

7. Keep tire chains on the tires when roads on the major portion of the routes are dry and clear of snow.

8. Try to run to the nearest garage or service station with a tire which has gone flat on the route. Stop immediately and put on a good tire on the spot. This prevents damage to side walls.

And management can still further prolong tire life by providing its own or outside service to:

1. Rotate tires from wheel to wheel, side to side and front to rear, to give more uniform tire wear.

2. Check front wheel alignment periodically. This prevents uneven and rapid wear.

3. Adjust or balance brakes periodically to prevent locking of individual wheels and excessive tire wear.

Watch the automotive pages of succeeding issues of "Food Industries" for articles on the maintenance of your truck fleet under wartime conditions.—THE EDITORS.

Tires that have been retreaded give several thousand miles of additional service. This is a close-up of a retreaded tire that has been driven 4,000 miles on the front wheel of a 5-ton milk truck.

Mechanized Ice-Salt System Refrigerates Armour Trucks

Quick-action cooling obtained by pumping low-temperature brine through finned coils while fan blows air over the coils. Small gasoline engine drives pump and fan

QUICK in action, positive in operation and occupying a relatively small volume of useful payload body space, the "Coldjet" refrigerating system installed in 21 of Armour & Co.'s trucks is designed to provide interior body temperatures of 34 to 38 deg. F.

The system, manufactured by the Coldjet Truck Refrigerators Division of Industrial Manufacturing & Engineering Co., Chicago, Ill., is made up of a rectangular ice and salt tank, a group of finned cooling tubes with an air-circulating fan in back of the tubes, a centrifugal pump to circulate the cooling brine from the tank through the tubes and a small independent engine and driving means to operate both the pump and the fan.

The system was put into service by Armour in the early part of 1940, and according to J. B. Scott, vice-president in charge of transportation for the company, it has given reasonably satisfactory service. The particular Armour truck shown in the illustrations is also unusual in that it has an aluminum body designed at the direction of Mr. Scott and built by the Armour car lines.

How System Works

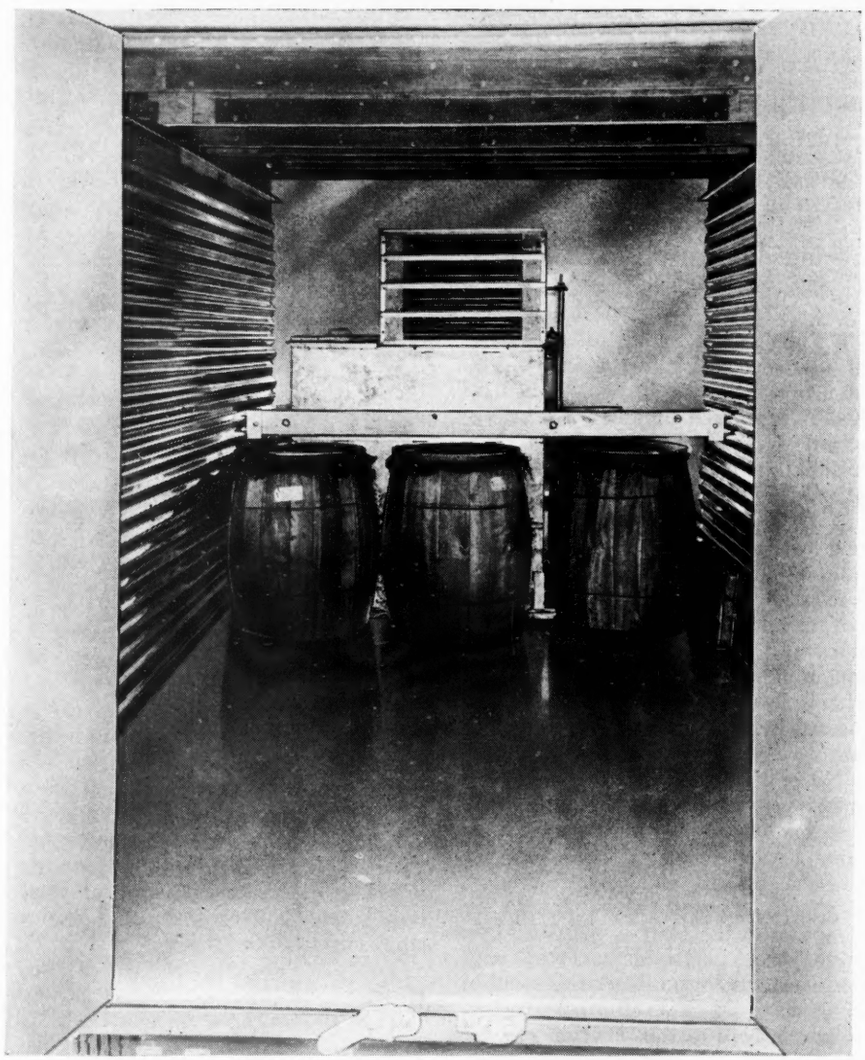
In the "Coldjet" refrigerating system, the ice and salt tank is set up vertically in the front end of the truck or trailer body, with the bank of finned cooling tubes in a rectangular housing on top of the tank. The air-circulating fan is behind the cooling tubes and is driven by a belt and pulleys from the shaft of the small independent gasoline engine of the system.

The centrifugal pump which circulates the cooling brine from the tank through the coils is located outside the tank near the bottom. This pump is driven by a vertical shaft and a belt connected with a pulley on the cooling-fan shaft. So the drive is from the gasoline-engine shaft to the cooling-fan shaft and thence, by a second belt, to the pump shaft. Whenever the gasoline engine is in operation, both the cooling fan and the centrifugal-pump operate simultaneously.

The gasoline engine of the system may be located on the vehicle wherever convenient to the owner, being placed inside of the body, outside of the body on the front panel of the truck or on the nose of the trailer, or outside the body below the floor, as in the case of the Armour truck illustrated.

The gasoline engine is a ¾-hp. unit and has its own gasoline tank. This engine is equipped with a float-type carburetor and an air filter. It starts easily.

In operation, the brine solution made from the ice and salt in the tank is circulated by the centrifugal pump from the bottom of the tank to the top of the finned copper cooling tubes. The solution passes downward through the bottom cooling tube and thence to a header pipe set lengthwise inside of the tank and above the brine solution.



Rear view of the "Coldjet" refrigeration system as installed in the Armour & Co. truck shown on the opposite page. The brine tank is set up at the left front end of the body with the tank filling cover at the extreme left top of the tank, the cooling coils at the right and the vertical shaft leading to the cenrifugal pump at the extreme right. Protection is provided to prevent the load carried from damaging the brine tank.

An International with an aluminum body, one of 21 Armour & Co. trucks equipped with the "Coldjet" refrigeration system early in 1940. The independent gasoline engine and tank are located under the left front corner of the body. The belt drive from the gasoline engine to the cooling fan inside is on the outside of the body and is protected by the guard shown.

Brine Passes Through Sprays

A row of jets, from which the system takes its name, is set in the bottom of the header pipe inside the tank. In passing from the cooling tubes to the storage tank, the solution is sprayed through the jets into the reservoir of brine held in the storage tank.

While this circulation of brine is taking place, the fan in back of the cooling tubes is circulating air over the tubes to remove heat picked up from the food products carried in the body.

The positive circulation of the cooling air throughout the body and the atomization of the warmed brine in passing from the cooling tubes back into the reservoir in the storage tank give the system its quick action.

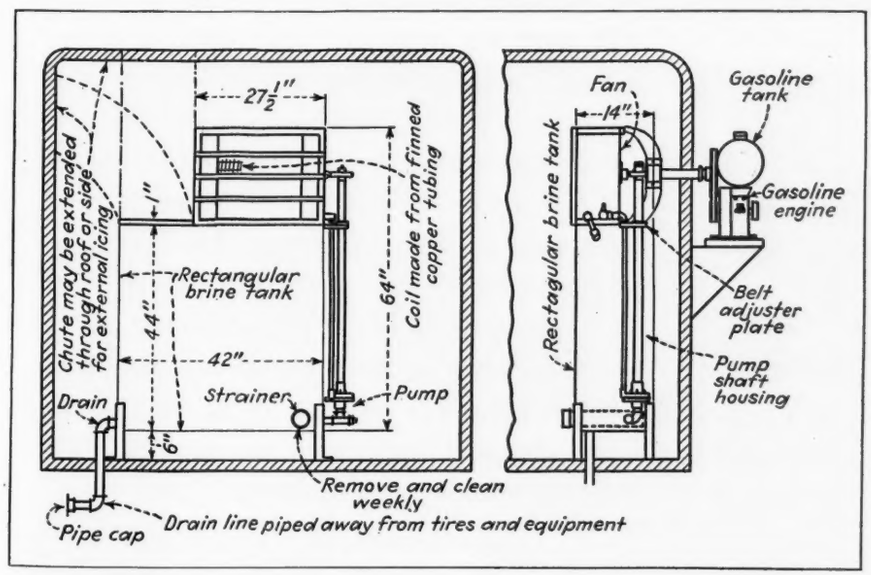
In the Armour truck installation, the brine tank has a capacity of 600 lb. of ice and salt. It is filled from inside the truck body, before the load is placed in the body, through a rectangular opening that has a cover over it. However, the brine tank can be filled from outside the truck or trailer body by means of a chute. Such a chute is shown by dotted lines in the accompanying drawing of the system.

To prevent trouble in the operation of the system through dirt, ice and salt working into the pump and later clogging the orifices in the atomizing jets, a strainer is installed in the suction feed line at the bottom of the tank. The strainer is composed of two concentric, perforated pipes, the inner one of which may be removed from the outside of the tank for cleaning.

The "Coldjet" system is factory assembled and is made completely watertight. The storage tank and cooling tubes come as a unit along with the circulating fan and the centrifugal pump.

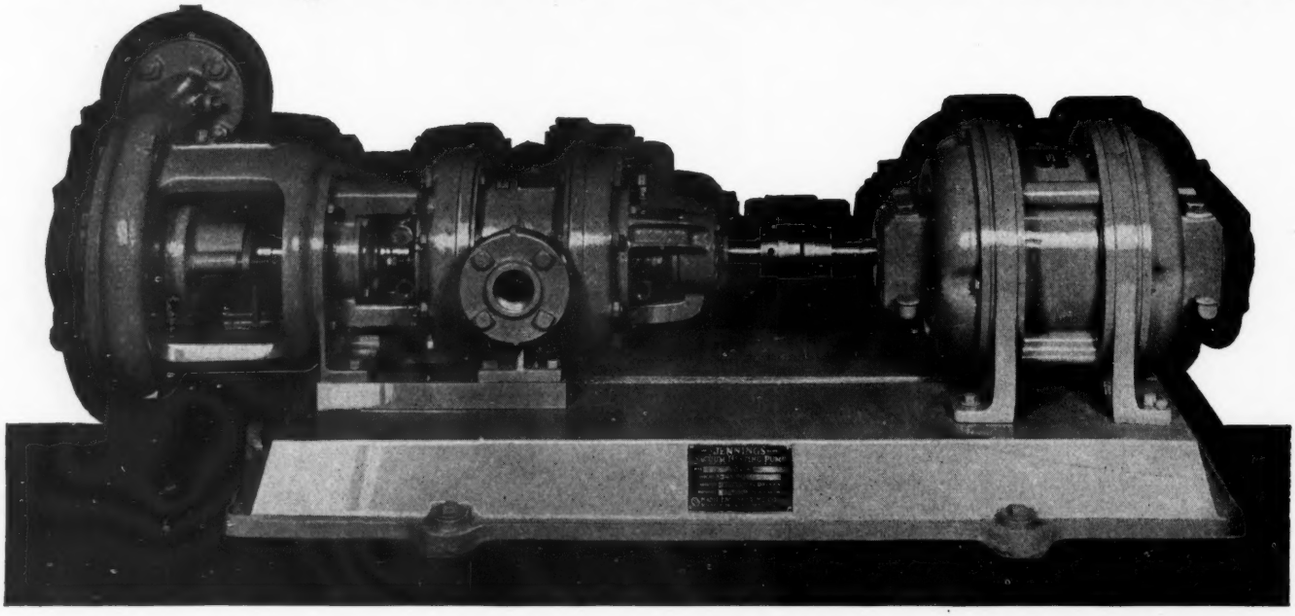
When the above unit is installed, all that remains is to locate the gasoline engine as desired and hook up the belt drive to the cooling-fan shaft.

In the Armour truck installation, the gasoline motor is located below the body floor under the left front corner. The belt drive upward to the fan shaft is protected by a guard.



Diagrammatic drawing of the "Coldjet" refrigerating system showing its component parts. In the installation shown, the gasoline engine is mounted on the front truck panel or nose of a trailer. The brine tank may also be filled from the outside if desired by extending a chute as shown by the dotted lines to the body side or roof.

Nash—the Perfected Vacuum Pump for Evaporators and Condensers

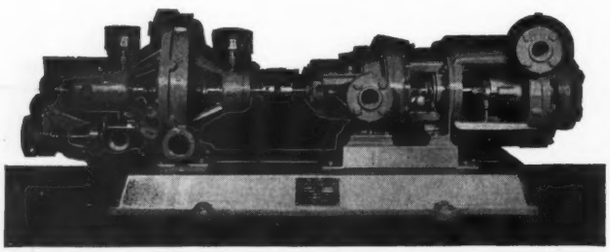


COMBINATION VACUUM REMOVAL UNIT ESPECIALLY DESIGNED FOR SATISFACTORY OPERATION ON CONDENSERS WITHOUT BAROMETRIC LEG

Especially designed for drawing air and liquid from high vacuums, the Nash Vacuum Removal Unit is an efficient combination of a standard Nash Vacuum Pump and a Jennings Centrifugal. This design may be had in either motor or steam turbine drive, and may be installed with confidence that it will operate perfectly.

Nash Vacuum Pumps for Evaporator and Condenser Service offer unusual advantages. Vacuum is non-pulsating, producing uniform operating conditions and assuring a better product. Nash Vacuum Pumps have no valves, gears, pistons, rings, or mechanical complications. The single moving element rotates without metallic contact, and no internal lubrication is required. In standard design these pumps maintain vacuums up to 27" of mercury.

Nash Pumps are compact, and require but a fraction of the space taken by old type equipment. They may be installed where convenient, and they operate at suitable speeds for direct connection to either electric motors or steam turbines. Nash engineers will be glad to recommend proper equipment to exactly meet your particular requirements.



THE NASH VACUUM REMOVAL UNIT MAY BE HAD EQUIPPED WITH STEAM TURBINE DRIVE WHERE THIS TYPE IS PREFERRED

NASH ENGINEERING COMPANY

SOUTH NORWALK · CONNECTICUT, U. S. A.

NEW PACKAGES & PRODUCTS

Liquid Apple

VARIOUS BRANDS of apple juice have been on the market for several years, but S. & W. Fine Foods, Inc., San Francisco, Calif., is introducing "liquid apple," a creamy white apple juice containing a large proportion of the apple pulp in finely comminuted form.

The juice is produced by a two-stage Schwartz extractor—a unit capable of handling 2½ tons of apples per hour, fed into the machine complete with skins and cores. By continuous process the juice is deaerated, flash pasteurized, filled into cans, sealed, sterilized and chilled, the whole operation taking but a few minutes. S. & W. apple juice is provided in 12-oz. tins or in a 47-oz. family-size tin.

Four-course Wine Carton

AN ACCOLADE for the cleverest packaging idea goes to Taylor Wine Co., Hammondsport, New York, who is marketing a "Taylor Wine Foursome" containing four 2/5-pt. bottles of New York State wines to be served throughout a dinner for two persons. The attractive, transparent-cellulose-wrapped package offers sherry as an appetizer or spiritual accompaniment for the soup course, sauterne with the entree (recommended with fish or white meat), either burgundy or claret with the meat course (game, roast or steaks), and port as a dessert wine.

Part of the Taylor sales strategy was to introduce the consumer to new or less familiar types of wine. The average consumer knows sherry and port, so the foursome contains bottles of these wines, with burgundy (or claret) and sauterne.

Although the profit margin of the foursome is less than that of a single fifth, the sampling value of the former has paid dividends. According to the company, check-ups in test territories indicate that after the introduction of the foursome, dealer sales of all four types of wines definitely increased.

Pralined Beans

FROM A RECIPE handed down through family generations for more than two centuries, Angelica Foods, Inc., Caldwell, N. J., prepares a distinctive food specialty—pralined beans. This product is unlike baked beans or pork and beans. It is prepared with pea beans, molasses, beef suet, sugar and salt—cooked Southern style in small individual pans to obtain the proper flavor.

No tomato pulp or sauce, spices, flavoring ingredients or pork are used in preparing the product.

Concentrates for Britain

CITRUS CONCENTRATES, INC., is building a new $1,500,000 plant in Dunedin, Fla., to meet orders for its "Sunfilled" pure concentrated orange juice and grapefruit juice. Already marketing its products all over the country, the company has a $1,000,000 initial order to produce concentrates for Great Britain under Lease-Lend.

The highly concentrated juices are free from any flavoring, coloring, added sugars or preservatives. Water is removed from the juice by a special process. The juice is deaerated but not pasteurized, and it retains a high vitamin C content. Peel oil, which is subject to oxidation, is removed from the juice. Sweet and sour juices are blended to give uniformity of flavor.

VITAMINS for VICTORY

—A pledge by Hoffmann-La Roche, Inc., currently one of the nation's leading producers of synthetic vitamins B_1 and C, in the words of its president, Elmer H. Bobst

"The best fighting equipment will be worth little in this war unless our boys serving under the Stars and Stripes possess the strength and staying power to man it with maximum efficiency. They must possess buoyant, top notch health. Workers in defense industries likewise cannot give their maximum effort unless their health is safeguarded.

"I feel certain that vitamins are one of the important keys to the victory we must win, and to the new and stronger America we have just started to build. For in this terrible contest of armed man against armed man, the one who is most likely to win will be the fittest—and the one who possesses the greatest strength, fortitude, and morale. To achieve the latter, vitamins are just as important as bullets.

"American production is already geared up to turn out synthetic vitamins by the tons. At Roche Park, where our laboratories have been toiling day and night, seven days a week, we are rushing new units which will soon multiply present record production. We are determined that the country's armed forces will not have to get along without vitamins, nor will the men and women straining for higher production in defense industries, nor will our population at large. We are going to see to it that there will be no shortages."

HOFFMANN-LA ROCHE, INC. • NUTLEY • N. J.

OPM Places Restrictions On Foods and Materials

Orders affect tires, wrappers, cans, fats and oils, coffee, alcohol, molasses and sugar

OPM ORDERS and regulations affecting many phases of food industry operations have been issued in the past month. These orders are summarized in the following paragraphs for the convenience of those directing food manufacturing operations.

Tires Rationed

An order restricting the sale of new tires includes in the "eligibility classification" trucks operated for the transportation of raw materials, semi-manufactured goods and finished products, including farm products and foods. But a proviso excludes from the list trucks used to transport commodities to the ultimate consumer for personal, family or household use. This proviso means no new tires for dairy or bakery trucks delivering house-to-house. An amendment to this order defines a "truck" as "as any vehicle designed for use on the highways to carry freight, including raw materials, semi-finished and finished goods, farm products and foods."

Cellulose Ban Extended

The ban on the use of transparent cellulose was extended on January 7. Twenty-four general uses of this material, either for packaging or manufacturing, are prohibited until February 15. Among the 24 were these food products: bottled beverages, including alcoholic beverages and extracts, but not seals on bottles containing fluids which normally leak or evaporate, bottled foods, including sauces, salad dressings, fruit juices, pickles, olives and preserves; and canned foods of all sorts.

Ban on Coffee Cans Seen

An order restricting the purchase of tin cans by the coffee industry during the first quarter of the year to 50 percent of the quantity used during the same period of 1941 was expected late in January. And the order was expected to completely prohibit the use of tin containers for coffee after March.

Fats and Oils Restricted

To conserve the supply of fats and oils, an OPM order prohibited during January delivery of these materials to manufacturers or processors in excess of a 90 day's operating supply. And on January 2, Price Administrator Leon Henderson issued a revised schedule of maximum prices for fats and oils, changing the ceiling-price date from November 26 to October 1, in effect raising the price level by a minimum of 11 percent. Additional materials were brought under the General Imports Order M-63 on January 13, including rapeseed oil, coconut oil, copra, palm oil and tung oil.

Coffee Prices Raised

A definitive schedule of maximum prices for green coffee, superseding the emergency order of December 11, was announced on December 28. Whereas the emergency schedule covered only 15 grades, the new schedule takes in 39 grades imported from 28 countries. Maximum prices established for spot coffee are one-quarter of a cent per pound higher than those set in the temporary schedule. Ceiling prices for "future contracts" traded on the New York Coffee and Sugar Exchange are retained at the levels prevailing on December 8.

Oil of Peppermint Prices

The advisability of establishing maximum prices for oil of peppermint, which has almost doubled in price since mid-November, was discussed by the industry and the government at a meeting on January 13.

Alcohol and Molasses

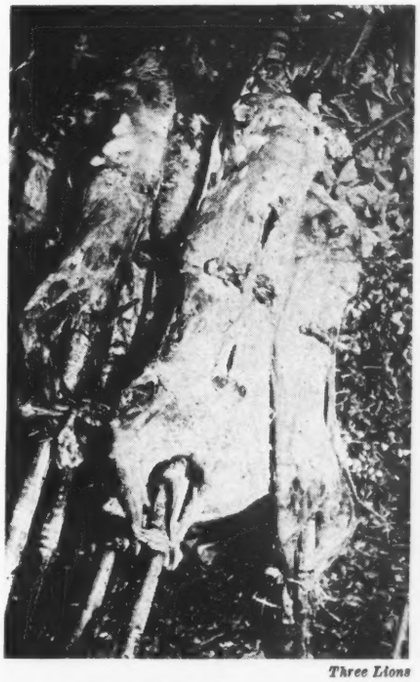
Restrictions on the use of ethyl alcohol and related compounds are provided in an amendment to the General Preference Order M-30, issued on January 7. And producers are required to use corn or grain instead of molasses insofar as possible. A companion order, M-54, relating to molasses also was issued. It restricts quantities to consumers and fixes rates of consumption. Molasses for the production of beverage spirits is prohibited.

Asks Glass Conservation

Glass container manufacturers, bottlers, packers and other users of glass containers were asked by OPM's Bureau of Industrial Conservation on January 5 to conserve raw materials by simplifying bottle sizes, shapes and finishes wherever possible.

Sugar Restricted

Deliveries of sugar to industrial users were restricted by OPM order on December 13 to the rate prevailing in 1940. And in mid-January it was announced that a revised sugar order was forthcoming, about February 1. The new order, it is said, will base permitted



Three Lions

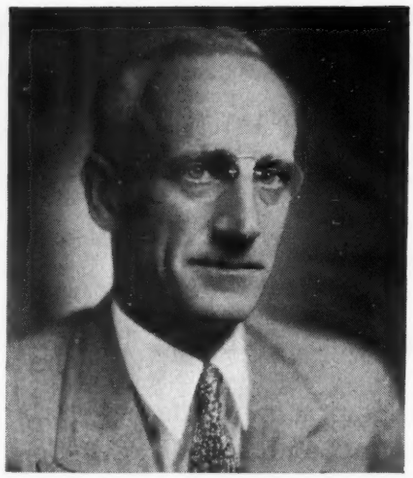
EUROPE'S BLACK MARKET

The food situation in Nazi dominated countries is so bad that many people starve, and conditions have led to a bootleg system of no small proportions. This so-called black market resorts to all sorts of devices. This picture shows meat stored in a pit in the woods of Holland. Vast quantities are hidden in this manner, and though much of it spoils before reaching the consumer, it nevertheless brings a high price.

More Restrictions To Be Put on Tin

All staples, such as coffee, to be ordered out of tin. Several other foods to be affected

A FAR-REACHING ORDER sharply limiting the use of tin in cans and containers was in tentative draft form late in January. Expected to be ordered out of tin almost entirely were all staples, such as coffee and crackers. The tentative form of the order also listed a number of other foods either among the items on the banned list or among those eligible for only a reduced quota. Beer was expected to be ordered out of tin, except that packaged for export. An undecided question was whether to restrict sizes of cans—a move certain to come.



ASSISTANT TO JESSE JONES

Clarence Francis, president of General Foods Corp., New York, has been appointed Administrative Assistant to Federal Loan Administrator Jesse Jones and Sam Husbands, president, Defense Plant Corp.

OPM Will Organize Tin Salvage Program

UNTIL now considered not worth the cost and effort, salvage of tinned containers is to start soon under the impetus of WPB's Division of Conservation. Project priority ratings are being granted for salvage plants in several major metropolitan centers.

Salvage operations of this type, at least for the present, will be confined to city areas because of the difficulty of collecting containers in sufficient quantities elsewhere to make the enterprise worth while.

Offers Fish Boat Insurance

WAR RISK insurance on American ships or fishing vessels is now available to shipowners through the United States Maritime Commission, which has announced that a $40,000,000 fund is open to those unable to obtain adequate insurance for their vessels at "reasonable terms and conditions" from commercial underwriters.

Metal Foil Order Affects Packers

Use of metal foil restricted after March 31; packers face ban on transparent wrapping

METAL FOIL as a packaging material is on its way out for the duration of the war, and use of transparent cellulose except for products which must be kept fresh is going the same route.

OPM's conservation order covering tin specifically bans its use for foil after March 31, 1942, and restricts its use between now and then to 50 percent of the comparable 1940 period. Similar provision regarding lead foil becomes effective also on April 1; aluminum foil virtually went off the market last year. The tin order also bans use of tin for beverage dispensing units, including tin piping, and for galvanizing except for food processing equipment. Not covered by this order is tin for cans; a separate order regulates this.

The decorative use of transparent cellulose is barred for bottled foods, including sauces, salad dressings, fruit juices, pickles, olives and preserves, and canned foods of all sorts. Candy box overwraps also are barred.

Wickard Tells Public About Sugar and Fats

APPEARING as a guest speaker on Eleanor Roosevelt's Sunday evening radio program, Secretary of Agriculture Wickard on January 18 cautioned the public to be prepared for shortages in sugar and in fats and oils. But the Secretary also outlined steps being taken to offset these possible shortages.

"Scram, you hounds! Wanna give us a bad name?"

OPM Places Restrictions on Foods

(*Continued from page 67*)

deliveries of sugar over a period in 1942 on the amount of sugar used or resold by the receiver in a corresponding period of 1941. The new order is designed to allow for shifts of population to defense areas since 1940 and to permit a more equitable basis for the distribution of sugar for businesses that have either begun, or been expanded, since 1940. The new order will not increase the total supply of sugar available.

Sugar Supply Situation

To compensate for reduced sugar shipments from the Philippines and Hawaii, the 1942 sugar quotas for all sources have been increased to give a total of 8,032,074 short tons (raw value) as compared to 6,616,817 in 1941. Included in the 1942 quotas are 1,127,420 short tons for Hawaii and 1,237,764 for the Philippines, which supplies may be partially or completely curtailed by the war. Further, it is estimated that sugar stocks in the country were increased in 1941 by about 500,000 tons. Still another factor in the sugar situation is the possibility that the Western Hemisphere will be called upon to furnish the Allies with somewhat larger supplies of sugar in 1942 than in prior years. Also bearing on the sugar problem is the OPM plan to have 60 percent of the distilling industry's capacity diverted to the manufacture of ethyl alcohol from grain, therefore making molasses available for refining into sugar.

Sugar Prices Upped

Ceiling prices for refined and other "direct consumption" sugars were adjusted upward to reflect the recent increase in raw cane sugar prices in an amendment issued on January 10 to Price Schedule No. 60. The maximum prices that refiners can charge was raised by 20 cents per hundred pounds for direct consumption sugar. Wholesale prices were also adjusted upward.

Form Nutrition Foundation

Dr. Compton heads it. Several hundred thousand dollars is contributed by fifteen firms

TECHNOLOGICAL DEVELOPMENTS important to the entire food industry may be expected to come out the Nutrition Foundation, a nonprofit organization formed by 15 food and container manufacturers and headed by Dr. Karl T. Compton, president of Massachusetts Institute of Technology. The 15 firms —more are expected to join—have contributed several hundred thousand dollars to finance the work of the Foundation in developing ways of processing and handling foods so as better to retain their nutritive values. And whatever discoveries are made will be available to the industry in general.

The firms which have contributed to the Foundation's fund include: American Can Co., Beech-Nut Packing Co., California Packing Co., Campbell Soup Co., Continental Can Co., Corn Products Refining Co., General Foods Corp., H. J. Heinz Co., Libby, McNeill and Libby, Inc., National Biscuit Co., Owens-Illinois Glass Co., Quaker Oats Co., Standard Brands, Inc., Swift & Co., and United Fruit Co.

Food Technologists Organize in New York

ON January 6, 1942, thirty-six members of the Institute of Food Technologists met at the New York University faculty club and organized the New York Society of Food Technologists, with the purpose of becoming a regional section of the Institute of Food Technologists.

Officers elected to the executive committee of the new organization include Dr. J. H. Shrader of N. Y. U., chairman; D. J. Maveety, vice-chairman; R. F. Light, treasurer; G. L. Montgomery, secretary; and L. W. Waters, A. W. Thomas, L. V. Burton and Raymond Hertwig, councilors.

All interested food technologists in southern New York, Connecticut, New Jersey and eastern Pennsylvania are invited to join this organization and should communicate with the secretary, care of FOOD INDUSTRIES.

Calls Nutrition Conference

Governor Saltonstall of Massachusetts has called a nutrition conference, this to be held in Cambridge on February 6. The conference will be conducted by the Massachusetts Committee on Public Safety and its subcommittee on nutrition.

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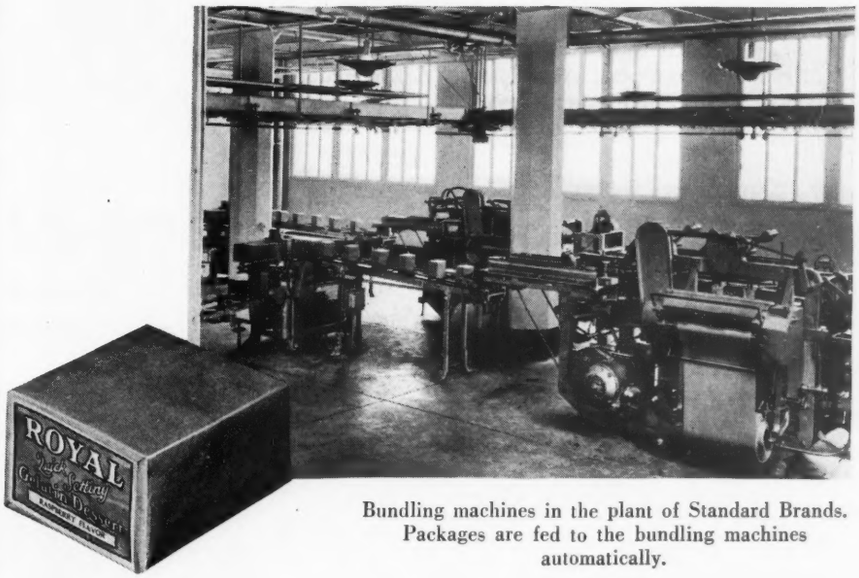
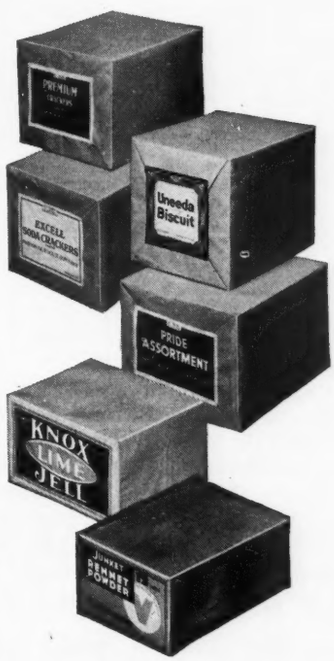
MACHINE BUNDLING
is now saving important
DEFENSE MATERIALS



Bundling machines in the plant of Standard Brands. Packages are fed to the bundling machines automatically.



The substantial saving which machine bundling makes in packing material is now contributing to our Nation's defense effort . . . Using strong paper instead of cardboard boxes, the bundling machine produces a sturdy wrap with the minimum amount of material.

But that's not all. Shipping weight is also cut by 66%. With transportation playing such an important part in our national activities, this saving is of paramount importance. Labor, too, is freed for more important tasks than packing—for the bundler can be operated in conjunction with the cartoning machines.

Latest models are adjustable for more than one size of bundle, making it possible to bundle a line of different products.

Our Bundler is but one type of over 70 different models now serving America's package goods industry.

Literature on request

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Mexico, D.F.: Agencia Comercial Anahuac, Apartado 2303
Buenos Aires, Argentina: David H. Orton, Maipu 231
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PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

Cuban Agreement Involves Foods

U. S. gets concessions on some items and cuts tariff on Cuba's sugar, molasses and beef

A SECOND SUPPLEMENT to the U.S.-Cuban trade treaty, signed in Havana on December 23, became effective early in January. This country obtained concessions on Cuban duties on 38 kinds of American goods sent to that country, including canned soups (except tomato), canned beans, peas, sweet corn and asparagus; corn starch, sauces and salad dressings, cider and grape juice.

The principal U.S. tariff reduction was on sugar and molasses, the former being cut from 90 cents to 75 cents per 100 lb. for 96-deg. sugar, the latter by a horizontal 50 percent of former figures. The 4.8 cents per pound duty on chilled, frozen or canned beef from Cuba also was cut, to three cents per pound.

AMS Seeks Specialists

CIVIL SERVICE examinations have been announced for persons wishing to qualify as Assistant Marketing Specialist or Junior Marketing Specialist, Agricultural Marketing Service, U. S. Department of Agriculture.

Selective Service Deferment

A statement addressed to management by the director of Selective Service, Brig. Gen. Lewis B. Hershey

"MOST of the actual combat fighting in this war will be done by the young men of America. Modern warfare is of such a nature that it requires the greatest in physical stamina, coordination, and reflex action. Generally speaking, the fitness of men for modern combat services is in the inverse ratio to their age.

"Under recent legislation, more than 26 million men between the ages of 20 and 44, inclusive, are liable for military service. There are an additional 13 million men 18 and 19 years of age, and 45 to 65 years of age, who are to be registered. This gives America a total manpower of some 41 millions of men who must do the tasks that are necessary in total war for total victory.

"Selective service in total war is not going to deviate from the fundamental principles which governed its operations during the peacetime training program. Men will continue to be deferred from military service when they have dependents. Men will continue to be deferred from military service when they are 'necessary men,' and are difficult or impossible to replace.

"However, management and industry must recognize that the man who is deferred as a necessary man is deferred temporarily and each employer has the responsibility to secure and train replacements for such deferred men who are physically fit and would otherwise be available for military service. Occupational deferments are usually for a 6-month period. When absolutely necessary, such deferment may be continued for additional 6-month periods, but only where their continuance in the present job is absolutely necessary for the maintenance of our national health, safety and interest.

U. S. Army Signal Corps.

BRIG. GEN. LEWIS B. HERSHEY

"There is an adequate supply of replacements for necessary men among those who are physically unfit for military service, those who are presently deferred because they have dependents, those who are above the ages liable for military service—45 to 65—and in many cases among the women of this country.

"Employers must be honest and sincere in their requests for deferments and must limit such requests to cases of men who are in fact necessary. No industry or activity, no matter how closely identified with national production for war, can ever become a refuge for those who seek to avoid their obligation to their country in its hour of need."

FSA Announces Sweetener Policy

Canned fruit order permits use of the corn sweeteners without declaration on the label

Long-awaited, the tentative order in the canned fruits docket was printed in the January 8 *Federal Register*. By this order the policy decision of the Federal Security Agency was announced in regard to the sweetener question. As anticipated, it provides that up to certain limits mixtures of sucrose, dextrose, and corn sirup solids may be used without label declaration. The limits were those suggested by the corn sweetener manufacturers themselves as suitable percentage limits for the most satisfactory canned fruit products. This order, if sustained by the Administrator in the final order to be issued after the usual 22-day period in which objections may be filed, will in effect supersede the Hyde and Wallace rulings on use of corn sweeteners.

Other Standards Activity

The ice cream hearing opened on January 5, with every prospect of a long session. Details of the opening days of the hearing are described in another story in this issue.

Expected soon are tentative orders in the dockets covering canned fruit cocktail, the soft cheeses, and chocolate products. Reopening of the macaroni docket to consider vitamin and mineral questions had not been requested up to January 13. Announcement soon of a toxic spray residue hearing was expected in mid-January.

Now It's "Niacin"

AS SYNONYMS for "nicotinic acid" and "nicotinic acid amide," the terms "niacin" and "niacin amide" may be adopted. This is according to the announcement on January 19 that Federal Security Administrator McNutt has accepted the recommendation of the Committee on Food and Nutrition of the National Research Council.

Glass Container Production Increased

THE glass container industry, often reported in recent months to be at full-capacity operation, actually operated at only 85.6 percent of total rated capacity during 1941. Large stocks are being built up this winter, and more melting tanks are being constructed to assure an increase in productive capacity this year.

Improvements in operating effi-

ciency, which, according to Glass Container Association, helped to boost production by 30 percent in 1941, will be continued, with increased glass tonnage pulled per tank and higher machine speeds. In addition to the new tanks, other glass-making facilities are being reconditioned, and further trouble-shooting methods are being studied.

Cake Bakers Told What Lies Ahead

ANTICIPATING increased restrictions on non-munitions industries until war with the Axis Powers is won, members of the Wholesale Cake Division of the American Bakers Association during its annual meeting in Chicago, January 19 and 20, took steps to put their industry on a wartime basis.

Faced with a tire and truck shortage, and with a 1942 sugar restriction to probably 75 or 80 percent of that used during corresponding months in 1941, deliberation centered around the industry action to be taken.

Elimination of wasteful trade practices summarizes the recommended action of first importance.

Victory Gardens Planned

THE DEPARTMENT OF AGRICULTURE and Federal nutritional officials are promoting a "National Victory Garden Program" for next spring and summer throughout the United States. The program will involve farm and community vegetable gardens, farm fruit gardens, home conservation and preservation of fruits and vegetables. It will be conducted on a state-by-state basis, with officials in each state breaking down their efforts into communities.

ANSWERS TO FOOD LAW QUESTIONS

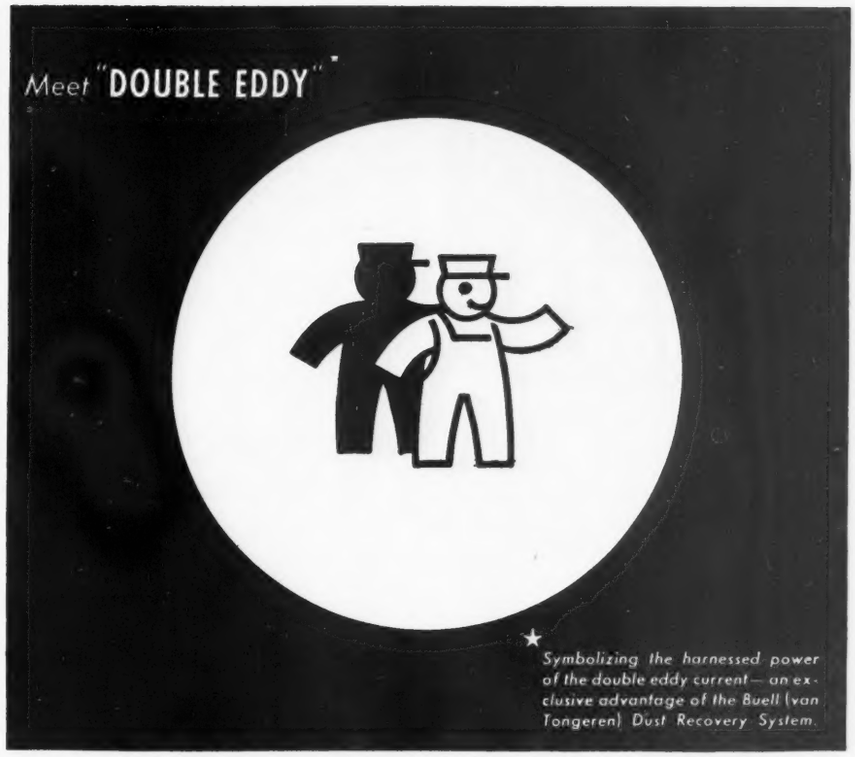
Interpretative Opinions from F&DA Letters to the Industry

Two items in the recent trade correspondence of the Food and Drug Administration are of interest to food manufacturers. These are abstracted below, continuing the series of "Answers," last printed on page 72 of the September, 1941, issue of FOOD INDUSTRIES.

ABSTRACTS

229. *Propylene glycol* in normal amounts is suitable for use in food products, when used to replace *glycerine* or other solvents.

230. *Monochloracetic acid* is a poisonous substance, use of which is not necessary in good manufacturing practice; therefore, its use in foods or beverages in any amount would render that food subject to seizure and its shipper to criminal prosecution.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"Double Eddy" is the little-man-who-saves-you-money on dust recovery. He works exclusively for Buell — and, on Buell equipment, has proved his ability as a dust recovery man all over the world, in every industry where dust is a problem.

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INVESTIGATE Gump Equipment for more efficient, economical processing of dry, powdered or granular food stuffs. Recommendations on equipment to meet your requirements will be offered without obligation.

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Modern, big capacity, rotary motion sifters with mechanical bearings throughout. Assure complete, thorough separations and uniformity of product. One to four separations . . . for sifting, scalping or grading.

• VIBROX PACKERS

Efficient, smooth-running, vibrating packers that usually pay their own cost through reduction of labor, handling and container costs. Made in five sizes to pack containers from 5 to 750 lbs.

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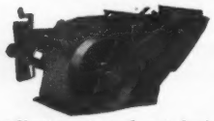

For accurately feeding, by volume, a pre-determined amount of material. Capacities easily and accurately controlled by single adjustment and set lock. Used in continuous mixing systems or for regulating capacity flow to production machines.

• BAR-NUN WEIGHERS

Speedy, extremely accurate automatic weighers that weigh and check-weigh a variety of materials into all types of containers. Two sizes —¼ ounce to 8 ounces, and 2 ounces to 2 pounds. Accuracy 1/64th ounce, plus or minus, to 8 ounces; 1/32nd ounce, plus or minus, to two pounds. Power feed models only.

Thoroughly tested and proved satisfactory, Gump Equipment will give you years of trouble-free, low cost service. Your investigation of these fine, correctly designed machines will prove them best for your needs.

Write for Complete Information

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IFT Program in the Making.

THE tentative program of the Institute of Food Technologists third annual meeting, scheduled for June 15-17 in Minneapolis, includes four three-hour sessions, two luncheon sessions and a day of plant visits. Problems of food technology brought about by wartime conditions will undoubtedly be discussed, although the program committee, headed by M. E. Parker, production manager, Beatrice Creamery Co., has not yet completed arrangements for speakers.

$26,000,000 Cut Seen in Stamp Plan

THE President's budget proposals to Congress in January contemplate a reduction of at least $26,000,000 in the $120,000,000-a-year volume of food stamp spending in the fiscal year beginning July 1.

As in former years, the appropriation to Surplus Marketing Administration for "exportation and domestic consumption of agricultural commodities" is not broken down, as between the amounts earmarked for food stamps, school lunches and direct relief, but an Administration spokesman stated that the new SMA appropriation contemplates the reduction in the stamp plan.

Reduction in the budget for agricultural distribution is from $225,150,000 available this year to $134,270,411 recommended for the coming fiscal period. Remainder of the curtailment would come from slowing down the school lunch, export subsidy and direct distribution programs conducted by the agency.

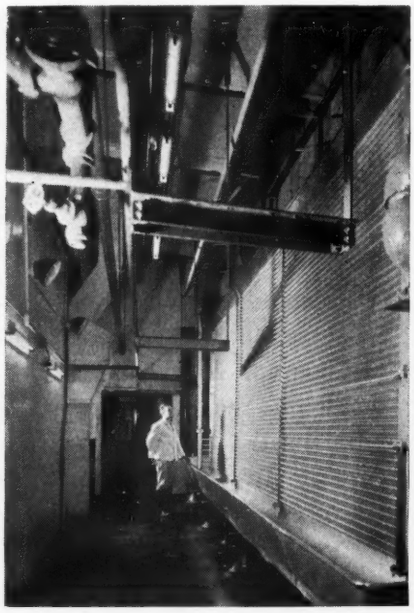
Ice Cream Confab Off to Slow Start

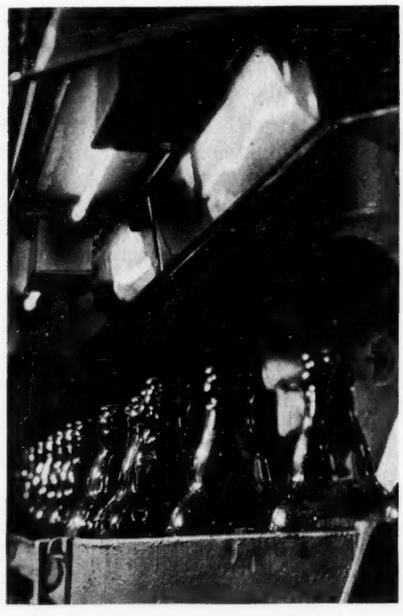
Standards hearing may take six weeks. Amendments, and standard for frozen desserts, proposed

Prospects for early adjournment of the ice cream standards hearing faded in the first hour of the first day (January 5). And representatives of the Food and Drug Administration, who once hoped for a three-week hearing, had decided by mid-January that four to six weeks probably would be required.

Industry's Proposals

International Association of Ice Cream Manufacturers made a number of proposals during the sessions last





ULTRAVIOLET STERILIZES AIR IN BREWERY

The first complete application of ultraviolet lamps to safeguard the production of beer has been made by Duquesne Brewing Co., Pittsburgh. The ultraviolet destroys air-borne microorganisms which may be present in the wort-cooling room, fermenting tanks and bottling works. A portable unit consisting of six 30-in. Westinghouse "Sterilamps" is inserted in an opening in the side of a fermenting tank after the beer is drawn off and remains there until the tank is to be used again. The minimum radiation time is about one-half hour. In the bottling department the lamps are installed over a conveyor carrying bottles from the soaker to the filler to keep the bottles sterile. The picture on the left shows the lamps which purify the air to which the wort is exposed as it flows over the coolers. Picture on right shows installation over bottle conveyor.

SCHEDULE OF EVENTS

FEBRUARY

2–13—Twenty-first annual Canners' and Frozen Food Packers' School, Food Industries department, Oregon State College, Corvallis, Ore.
12–13—Ozark Canners Association, annual convention, Colonial Hotel, Springfield, Mo.
15–22—National Cherry Week.
17–19—Technical School for Pickle and Kraut Packers, Michigan State College, East Lansing, Mich.
23–28—State College of Washington Institute of Dairying, fourteenth annual meeting, Pullman, Washington.
25—Wine Institute, Palace Hotel, San Francisco, Calif.

MARCH

9–12—American Society of Bakery Engineers, nineteenth annual meeting, Edgewater Beach Hotel, Chicago, Ill.
30–April 10—Siebel Institute of Technology, 68th cake course, Chicago, Ill.

month, including many important amendments, the outstanding ones being given here:

1. Permissible use of artificial fruit flavors mixed with fruits and/or fruit juices.

2. No minimum weight of nuts, and no restriction on use of imitation nut flavorings.

3. No restriction on use of imitation flavors with distilled alcoholic beverage or wine.

4. A limit of 1.4 percent maximum egg yolk solids in finished ice cream.

5. Use of Irish moss for the same purpose as the proposed gelatine, egg white, algin, gums and agar-agar.

6. A 10 percent minimum weight of milk fat in the finished ice cream, or 8 percent minimum if the weight of optional ingredients is not subtracted from the weight of the finished ice cream.

7. Permissible use of malt sirup and dried malt sirup as optional sweetening ingredients.

8. Permissible addition of harmless alkalis "to control vicosity, adjust protein stability and adjust pH of the product." Specifically requested were sodium bicarbonate, citrate and metaphosphate, disodium phosphate, magnesium oxide and carbonate, and calcium oxide, hydroxide, sucrate, lactate and chloride. Limits proposed were from one-tenth to two-tenths of one percent of the finished ice cream, depending on the alkali used. It was further provided that such alkalis would be used only when the acidity of the product was greater than three-tenths of one percent, expressed as lactic acid.

Also proposed by the industry was a standard for frozen desserts, the ingredients of which are similar to those of ice cream, sherbert and water ices, but which are frozen in the quiescent state rather than while being stirred.

Food Freezers Organize

DURING convention week in Chicago, January 26-30, packers of frozen foods organized the National Association of Frozen Foods Packers. E. T. Gibson, Frosted Foods Sales Corp., New York, was elected president, with R. O. Dulany and J. N. Seaman as vice-presidents.

Guard against deterioration!

Variable, uncertain storage temperatures defeat the purpose of your cold storage rooms —they injure your reputation for quality.

With rugged JAMISON - BUILT Cold Storage Doors on guard, your products are safe. . . . . INSTALL THEM NOW! It will pay you!

Consult our nearest branch or address JAMISON COLD STORAGE DOOR CO., Hagerstown, Maryland.

See details regarding our products on page 75 of FOOD INDUSTRIES CATALOGS & DIRECTORY

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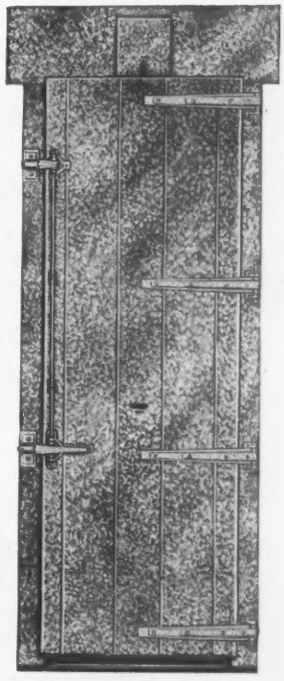

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Wartime Problems Occupy Canners

Sales problems in eclipse as prospective packs and can limitations get attention

IN SESSIONS dominated by production men and top executives, rather than by sales executives as in former years, the annual convention of the National Canners Association met at the Stevens Hotel, Chicago, on the 26th to 30th of January. The usual large scale business transactions were absent, for canners in 1942 will have little to sell beyond urgent needs.

A tentative plan to require each canner to reserve a percentage of each pack for Government purchase under a general preference order was announced by John Baxter of the WPB Canners Advisory Committee. The Government also urged as big a pack as possible to obviate any need for price control of canned foods. Canners also discussed what foods beyond corn, peas, tomatoes and green beans would be packed in cans this year, in view of the prospective limitation order on tin use.

Officers elected by the NCA for 1942 included Carroll E. Lindsey, Lake Highlands Canning Co., Highland City, Fla., president; G. S. Haxton, Oakfield, N. Y., first vice-president; A. W. Eames, San Francisco, Calif., second vice-president; and F. E. Gorrell, Washington, D. C., secretary-treasurer.

Macaroni Makers Meet

TRADE STRATEGY during the war and conservation of packaging materials were chief subjects discussed at the National Macaroni Manufacturers Association mid-year conference, January 26th in Chicago. Conference members recommended that sales to market outlets be controlled to a 30-day supply in stock, to keep retail store stock in top quality condition and avoid destruction of stock through the possibility of insect infection during the warm weather months.

Standardization of retail and bulk packages was urged to correct the slack-filled practice and conserve packaging materials. A committee appointed to survey packaging requirements of the industry will send out questionnaires for declaration of package sizes in order of preference for both retail and bulk items of macaroni products and noodles. These sizes will determine possible savings in paperboard and for making cartons and shipping cases.

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Urges Safeguards From Sabotage

State official outlines steps that should be taken to protect consumers of dairy products

War makes necessary unusual precautions to safeguard your plant and your product against sabotage. This is the opinion of S. V. Layson, milk sanitarian of the Department of Public Health of the State of Illinois. And to call the need for such precautions to the attention of milk plant operators, Mr. Layson has made these recommendations:

1. Lock your plant at all times when not in operation, particularly at night.
2. Do not permit strangers to enter or loiter about your plant.
3. New employees should be thoroughly investigated. Law-enforcing officials recommend that you take prospective new employees to your local police department or law-enforcing agency and have them fingerprinted. Police will investigate the prospective employee's record. All employees should have a birth certificate or citizenship papers.
4. Employ only trustworthy persons in the pasteurization and bottling of milk and milk products. Only properly pasteurized milk is safe.
5. Private water supplies should be safeguarded against tampering. If located outside a locked building, provide a structure over the well which can be locked. Elevated storage tanks should be inclosed and locked.
6. Remove rubbish and any material that may be a fire hazard.
7. Make arrangements with another plant to process your product in case of unavoidable shutdown of your plant.

Preservers Discuss Sugar

THE POSSIBILITY of sugar restrictions was first concern of National Preservers Association's annual meeting in Chicago, January 26th. Although a revision of OPM's sugar order had not yet been issued, basis for monthly civilian consumption was anticipated to be in terms of percentage of 1941 use. Allocations to processors were anticipated on the basis of requirements for a harvest season instead of on a monthly basis in terms of 1941 use.

Of particular concern was the need of government-industry cooperation in the problems of substitute materials, with increased use of dextrose to relieve sugar scarcity a probability. Use of substitute materials in the preserving industry calls for maintenance of quality-keeping properties and the best processing practices. The meeting included a discussion of Army and Navy specifications for containers.

Brewers Consider War Problems

Four hundred attend meetings of U. S. Brewers Association and Brewing Industry Foundation

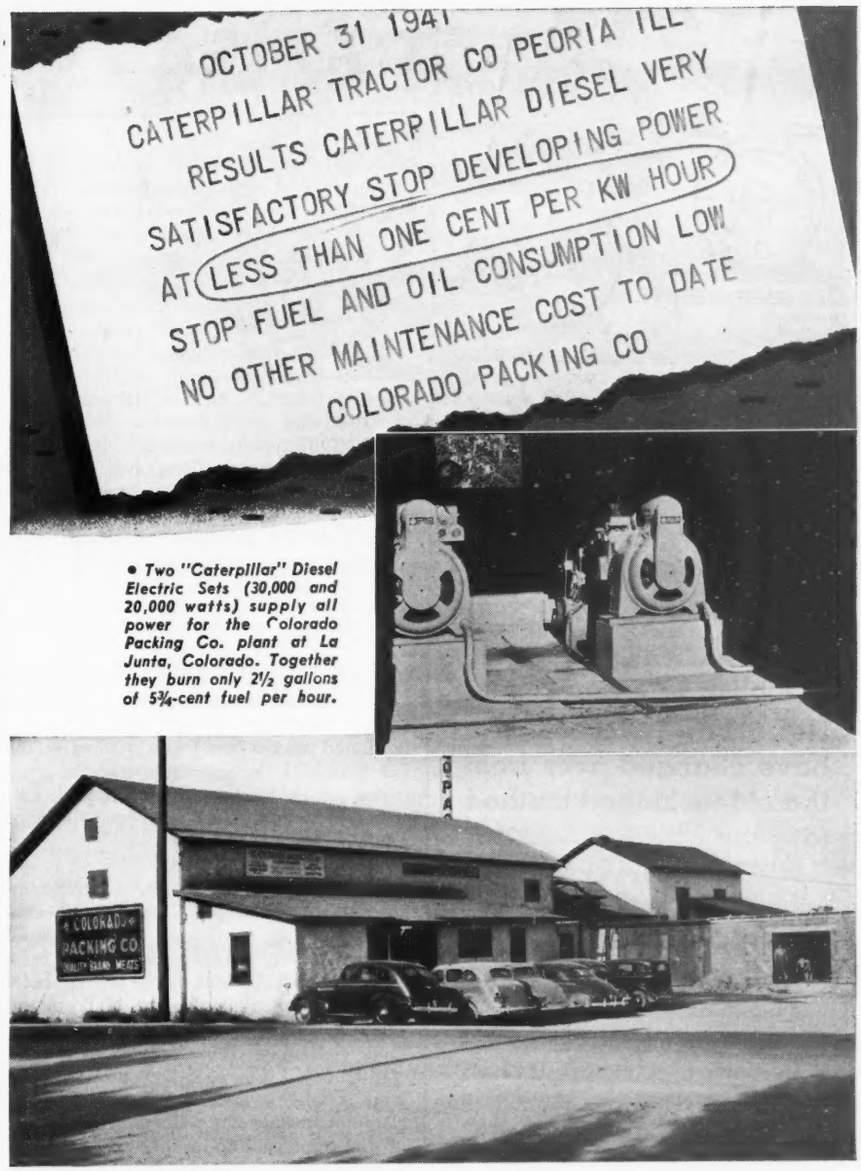
How to gear the industry to wartime conditions was the problem that occupied the attention of 400 brewers at the 66th annual meeting of United States Brewers Association and the 5th annual meeting of the Brewing Industry Foundation (formerly United Brewers Industrial Foundation) in Chicago last month.

An important contribution of the industry to the war program lies in the taxes it pays, it was pointed out by Carl W. Badenhausen, P. Ballantine & Sons, Newark, N. J., retiring chairman of Brewing Industry Foundation. The industry as a tax medium alone, brings in $470 million a year, excluding the income taxes paid by persons engaged in producing and distributing beer. But by way of additional help in the emergency, the brewers pledged themselves to make contributions in the form of defense bonds and generous financial aid to the Red Cross and similar agencies. They also agreed to place equipment and plant facilities at the disposal of civilian defense authorities if needed.

The problems arising from the all-out war effort were discussed at the USBA meeting by President R. J. Schaefer. He stated that the responsibilities of the industry in wartime include the development of substitutes in materials and processing methods, prevention of waste by utilizing spent grains and surplus yeast, continued research regarding materials necessary for the war effort, preservation and maintenance of equipment in the brewery and especially of existing dispensing systems, study of the distribution system with possible reduction in the number of weekly deliveries to retail outlets and economies in sales promotion.

The Brewing Industry Foundation elected the following officers: Chairman, Alvin Griesedieck, Falstaff Brewing Corp., St. Louis, Mo.; first vice-chairman, Christian H. Zoller, C. Schmidt & Sons, Inc., Philadelphia; second vice-chairman, William Piel, Piel Bros., Inc., Brooklyn, N. Y.; treasurer, R. J. Schaefer, F. & M. Schaefer Brewing Co., Brooklyn, N. Y.

The U. S. Brewers Association named these officers: President, H. J. Charles, Theo. Hamm Brewing Co., St. Paul, Minn.; first vice-president, A. Coors, Jr., Adolph Coors Co., Golden, Colo.; second vice-president, S. E. Abrams, Jos. Schlitz Brewing Co., Milwaukee, Wis.; treasurer, E. V. Lahey, Smith Bros., Inc., New Bedford, Mass.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WE ASKED the Colorado Packing Co., La Junta, Colorado, to wire us how they liked the two "Caterpillar" Diesel Electric Sets installed last July. Their answer is above.

When hundreds of owners tell the same story of big savings with these economical, dependable power-plants, it's time to take notice. "Caterpillar" Diesel Electric Sets burn such low-grade, low-priced fuels as No. 3 domestic burner oil cleanly and efficiently. Compact and rugged, they're built with the stamina for long life and heavy duty with low maintenance cost.

These modern electric sets supply steady voltage without the need of a switchboard, voltage regulator or other external control apparatus. They eliminate "demand charges" and interruptions due to storms. And they're easy to install and to operate. Sizes range from 15 to 90 kilowatts. Write for *free literature*, giving your power needs and present cost.

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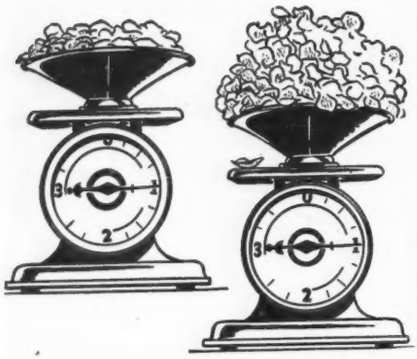
REG. U.S. PAT. OFF.

ELECTRIC SETS



How many chips in a pound?

A foolish question? Not a bit . . . Those who have changed over from the old-fashioned method to

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CONTINUOUS

POTATO CHIP

MACHINES

will tell you there's a whale of a difference. It's the dry, flaky, chips of uniform color and taste that add bulk and sales appeal to every pound. No burnt chips, no rancid or underdone ones come from these completely automatic machines. And, better yet, this superior product actually costs you much less than by other methods . . . You will be interested in the facts and figures on Ferry Machines together with their endorsement by many satisfied users. Catalog F.I. gives complete details on the 5 sizes which range in capacity from 50 to 350 lbs. of perfect chips per hour. Write for it today.

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CAPITAL VIEWS

PRECEDENT MAKING—The sweetener controversy received an important ruling from FSA Administrator McNutt in the decision regarding canned fruit. Permission to use without label declaration both dextrose and corn sirup or corn sirup solids seems to be a finding of much importance to all sweetener buyers. In effect, this is a new "Hyde ruling" which extends label exemption to reasonable quantities of these corn sweeteners. The fact that only named quantities can be used within the standard is not an unexpected restriction, because the corn products makers themselves asked only for the percentages represented by good commercial practice, substantially those indicated in the canned fruit ruling. Apparently food manufacturers are going to be given the maximum freedom in choice of sweeteners without the embarrassment of complicated label restrictions.

RE-USE CONTAINERS—Returnable containers will be required for many foods to relieve shortages. A return to the old-fashioned cracker barrel days is not welcome, but is one of the inevitable trials of a war period which food manufacturers will have to accept with the best grace and the maximum of ingenuity.

VITAMIN NAMES—A certain important government official (McNutt by name) complains that the names of certain vitamins are unpleasant, citing nicotinic acid as an example. This official suggests that better common or usual names should be devised which will tend to encourage the buying of food containing these important vitamin components. The food industries who have long sought to popularize attractive and glamorous names will welcome this evidence of the appreciation in high places of the importance of a mere name. But they do not think that F&DA is likely to follow the advice of this official by allowing them to devise new label names for ingredients and then to call the new name a "common or usual name." It would be nice if we could do that; but, Mr. McNutt, you forget that the law does not seem to contemplate what you ask us to do about *your* hobby.

EMERGENCY BEVERAGE—Spokesmen of American Bottlers of Carbonated Beverages are wisely pointing out that bottled soft drinks will be safe in any emergency, even where public water supplies may be temporarily contaminated by sabotage, bombing or other wartime hazard. This is a clever and aggressive bit of promotion. It is also in the public interest to educate folks about this matter.

CANNING WAGES—Canners of fruits and vegetables will be permitted to carry on manufacture of their products for government purchase at least until April 30 without immediate application of the minimum wage rates previously imposed by the Wage-Hour Division of the Department of Labor. In making this finding, the Secretary recognizes that the War Department must buy these foods for military purposes, and that it may not be able to get what it needs if canneries cannot carry forward customary manufacturing at the regular pay rates. Thus, the government notes that higher wages must impose higher prices. It would be well if the same principle could be applied on the goods which the public buys.

EMERGENCY FOODS—The public is being told what sort of food it should put away in the pantry as an emergency reserve. The list includes, principally, canned foods like evaporated milk, vegetables, juices, fruit, meat, and so forth. If every housewife did what was advised by Federal Security Administrator McNutt, we suspect that the hoarded tin cans might take away a very significant percentage of the total of this scarce container which is going to be available in the next few months. Those who make nonperishable foods that can form a logical part of such home stores without tying up tin containers will do well to bring this fact to the attention of Mr. McNutt so that he may amend his suggested list accordingly.

TALKING IN BILLIONS—Washington talks glibly in terms of billions of dollars and other astronomic figures as applied to guns, ships, munitions, and even food. This is a sound stimulant for the imagination, if not carried too far. Food manufacturers must appreciate that however small their contribution to the preservation of foods against spoilage, that much is their immediate and urgent duty. The only way that the supplies of foods needed for American, British and other friendly nation consumption can be prepared is to have every plant, no matter how small and no matter how remote, do the utmost within its power to put goods into keepable form in containers that can be handled for transport. Much ingenuity and much "makeshift" food technology will be needed to get this important result.

Seven Nations Form Dairy Memberships

NATIONAL memberships of the Inter-American Committee for the Dairy Industries have already been organized by seven of the seventeen countries represented on the committee's Council of Sponsors. American nations which have named members to the international dairying committee now include Canada, Dominican Republic, El Salvador, Panama, Paraguay, United States and Venezuela.

The memberships, formed to stimulate dairy industrial development, represent the fields of public health, education, dairy husbandry, technological and economic research, consumer interest and government.

Goals, Prices Revised For Canned Foods

As announced by Secretary of Agriculture Wickard on January 6, production goals for canned foods for 1942 have been revised as follows:

Tomatoes—40,000,000 cases, up 25 percent from 1941.

Peas—38,000,000 cases, up 33 percent from 1941.

Snap Beans—12,500,000 cases, at 1941 level.

Corn—24,000,000 cases, down 8 percent from 1941.

At the same time the following prices were announced as fixed for United States Government purchases of peas and tomatoes in 1942:

Up to December 31, 1942, a price of 95¢ per dozen for Grade C tomatoes.

Up to October 31, 1942, a price of $1.10 per dozen for Grade C peas.

These prices will be paid when the canner has been certified as having contracted to pay growers at least the minimum price for raw materials applying in his locality.

Dairy Products Output Set for This Year

Announcement of the goals for 1942 output of manufactured dairy products was made late in December by the Department of Agriculture. Evaporated milk output is to be increased by more than 20 percent over 1941, to a total of 3.5 billion pounds (82,000,000 cases). Cheese (American) production is to advance 33 percent, to a total of 900,000,000 lb. And dry skim milk output is to be increased 46 percent to 525,000,000 pounds.

These figures included supplies necessary to meet United States demand and also Lease-Lend shipments to Great Britain.

The program will necessitate the increase of manufacturing facilities in regions where additional milk supplies can be made available.

General Food Demands Increased by War

In addition to specific increases scheduled for canned vegetables and manufactured dairy products, the United States Department of Agriculture announced, on January 15, 1942, generally increased production goals because of materially increased food needs since Pearl Harbor. Among the crops in which increases are particularly desired are hogs, corn, oilseeds, rice, eggs, dry beans and vegetables.

Acreage allotment for corn in 1942 was increased from 90,000,000 acres to

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In one Nebraska vegetable cannery, for example, galvanized and stainless steel piping is cleaned easily with a SAFE, free-rinsing Oakite material. Recommended solution is simply circulated through piping for 20 minutes. Vigorous Oakite wetting-out and emulsifying action removes all vegetable particles. No residue or film remains on surfaces to affect products subsequently processed. From all standpoints . . . cost, time, effort . . cleaning results are superior to those obtained heretofore!

Tell Us YOUR Problem . . . We Can Help!

Whatever YOUR sanitation problem . cleaning cans before labeling; washing filter cloths; safely cleaning aluminum utensils; washing bottles and jars; steam cleaning blanchers, scalders, juice extracters, syrup fillers, etc . . . Oakite materials can save you time, money, effort. Since there is no obligation, won't you write today?

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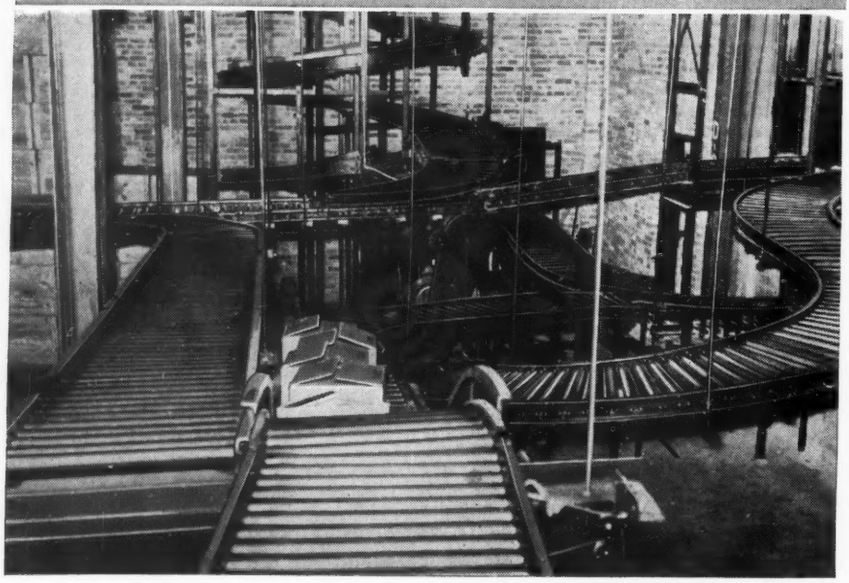
MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

STANDARD CONVEYORS
. . . VITAL "SUPPLY LINES" TO PRODUCTION MACHINES



Conveyors—planned and built by Standard—are a basic part of well organized production. They are the "arterial highways" of plant transportation—handling incoming material—work in process—keeping high-speed production machines well supplied—moving materials, parts, finished products from department to department. By cutting short handling time, eliminating repeated handling, avoiding wasteful waiting, they help to make manpower and man-hours count effectively in increased production.

Conveyorize To Meet Today's Need For Speed:

Your production and handling operations can be "conveyorized" with substantial savings of space, time, and costs. Send for booklet FI-2 "Conveyors by Standard"—a useful reference book on conveying and conveyors, contains many examples of conveyor installations, shows types of conveyors best suited to various units, parts, materials, products and commodities.

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Standard CONVEYORS

FIRST FOR FASTER PRODUCTION

CONSTRUCTION NEWS

	Pending (thousands)	Awarded January (thousands)	Total Awarded 1941 (thousands)
Bakery	.....	.....	$4,125
Beverages	$115	$82	8,399
Canning and Preserving	100	.....	1,089
Cold Storage Plants	.....	.....	780
Confectionery	.....	.....	368
Grain Mill Products	.....	60	6,784
Ice Manufactured	.....	.....	310
Meats and Meat-Products	.....	83	2,178
Milk Products	750	130	3,311
Miscellaneous	305	405	7,699
	$1,270	$760	$35,043

95,000,000 acres. Peanut acreage was increased from 3,500,000 acres to 5,000,000 acres; soybeans from 7,000,000 to 9,000,000 acres; and flaxseed from 3,367,000 to 4,500,000 acres. In addition, the department stated that efforts would be made to increase production of lard, tallow and grease. These measures are designed to prevent any shortage of oils and fats.

Other increases scheduled for important crops include: Rice from 1,200,000 acres to 1,320,000 acres; dry beans from 2,304,000 acres to 2,600,000 acres; eggs from 4 billion to 4.2 billion dozen; hogs for slaughter from 79,300,000 to 83,000,000 head.

War Causes Jump In Commodity Prices

SCARCITIES caused by war at sea, added to increased domestic demand, including some hoarding and speculation, drove commodity prices up sharply during the four-weeks period from December 13, 1941, to January 10, 1942. The N. Y. *Journal of Commerce's* general weekly index of commodity prices rose from 97.8 on the earlier date to 100 on January 10, the high mark for this index. In the same period, the same publication's grain index rose from 92.6 to 95.7 and the food commodity index rose from 94.5 to 99.0.

Individual commodity spot prices also upped sharply during the four-week period. Wheat, No. 2, hard winter, Kansas City, rose from $1.20½ to $1.22¾. Corn, No. 3 yellow, Chicago, rose from 77¢ to 81½¢. Flour jumped from $6.55 to $6.80 per barrel. Beef increased from 20¢ to 20½¢, lamb fell from 22¢ to 20¢, and pork loins rose from 20¢ to 22¢. Eggs fell from 37½¢ to 34¢, while butter rose from 35¢ to 35¼¢. Cheese also increased, from 25¾¢ to 26¼. Sugar rose with the new price ceiling from $3.50 to $3.74. Cocoa was steady. Canned tomatoes rose from 82½¢ to 90¢ while canned peaches and canned salmon were unchanged.

INDICATORS

Sugar deliveries for the eleven months, January-November, 1941, were 7,360,000 short tons, raw value, compared to 6,323,849 tons for the corresponding months of 1940, according to the U. S. D. A.

Wheat crop in 1941, final figures, was 945,937,000 bu., compared to earlier estimates of 961,194,000 bu., and to a 1940 crop of 816,698,000 bushels.

Soybean crop in 1941, final figures, was 106,712,000 bu., compared to earlier estimates of 111,300,000 bu., and to a 1940 crop of 77,374,000 bushels.

Corn crop in 1941, final figures, was 2,672,541,000 bu., compared to 2,449,200,000 bu. in 1940.

Oat crop in 1941, final figures, was 1,176,107,000 bu., compared to a crop in 1940 of 1,235,628,000 bushels.

Barley crop, 1941, final figures, was 358,709,000 bu., compared to 309,325,000 bu. in 1940.

Wheat, winter, expected in 1942 is estimated at 630,913,000 bu., compared to 671,293,000 bu. in 1941 and to 588,802,000 bu. in 1940. The 1930-1940 average for this crop was 569,417,000 bushels.

Flour production in December, 1941, by mills accounting for 65 percent of United States production, was 5,925,141 bbl., according to **The Northwestern Miller.** The figure for December, 1940, was 5,393,077.

Salmon pack on the Columbia River in the fall of 1941 was 406,635 cases, compared to 397,522 cases in 1940.

Pig crop in the Fall of 1941 is now estimated by the U. S. Department of Agriculture at 35,580,000 head, 18 percent over 1940, 33 percent over the 1930-1939 average, and 6 percent over the previous high record, made in 1939. Combined Spring and Fall pig crops in 1941 are estimated at 85,035,000 head.

Pig crop in 1942 is expected to reach 97,000,000 head, more than 10,000,000 above any other pig crop on record.

Beans, green and wax, canned in 1941, have been revised to 12,494,259 cases, compared to last month's figure of 11,955,041 cases. The 1940 pack was 9,188,777 cases.

Oleomargarine sales in November, 1941, as indicated by sales of internal revenue stamps, amounted to 34,851,960 lb., an increase of 10.3 percent over the November, 1940, figure. For the first eleven months of 1941 sales were 336,493,308 lb., an advance of 16.1 percent from 1940 sales for the corresponding months.

Milk, fluid, sold in November, 1941, showed an increase of 3.46 percent over November, 1940, according to Milk Industry Foundation.

Cheese, American, produced in November, 1941, is reported at 51,660,000 lb., up 43.7 percent from November, 1940. For the first eleven months of 1941 output was 670,605,000 lb., 18.5 percent above the 1940 figure for the period and 57.2 percent above the 1930-1939 January-November average.

Butter, creamery, produced in November, 1941, is reported to have been 115,160,000 lb., down 2 percent below November, 1940 output, but up 5 percent above the 1930-1939 November average.

Butter, creamery, produced in January-November, 1941, was 1,782,710,000 lb., 4.3 percent above output for the period in 1940 and 13.4 percent of the 1930-1939 January-November average.

Evaporated milk canned in November, 1941, was 258,203,000 lb., 92 percent above November, 1940, and 142 percent above the 5-year November average.

Egg production in December, 1941, ran at about 17 percent more than in December a year before.

Egg output per hen, in December, 1941, was the highest on record, about 10 percent higher than a year previous.

Eggs, dried, whole, whites, and yolks, produced in November, 1941, totaled 4,269,178 lb., an increase of 14,879 percent over output in November, 1940.

Chicks produced by commercial hatcheries in December, 1941, numbered 24,015,000, an increase of 52 percent above the previous record output of December, 1940. For the year 1941, output reached 1,052,468,000 chicks, a new record, and 17 percent larger than the previous high record output of 1939.

Fruits, frozen, in storage on January 1, 1942, totaled 175,048,000 lb., compared to 142,544,000 lb. on January 1, 1941, and to a 1937-1941 average of 118,386,000 pounds.

Vegetables, frozen, in storage on January 1, 1942, were 92,566,000 lb., compared to 78,504,000 lb. a year earlier.

Butter, creamery, in storage on January 1 of this year was 114,611,000 lb., compared to 41,497,000 lb. a year before and to a January 1 average in 1937-1941 of 65,983,000 pounds.

Cheese, all kinds, in storage on January 1, 1942, amounted to 201,685,000 lb., compared to 129,536,000 lb. a year previous and to 114,617,000 lb. as a January 1 average in 1937-1941.

Eggs, case equivalent, in storage on January 1, 1942, totaled 3,099,000 cases, compared to 2,709,000 cases on January 1, 1941, and to an average in 1937-1941 of 2,698,000 cases for the date.

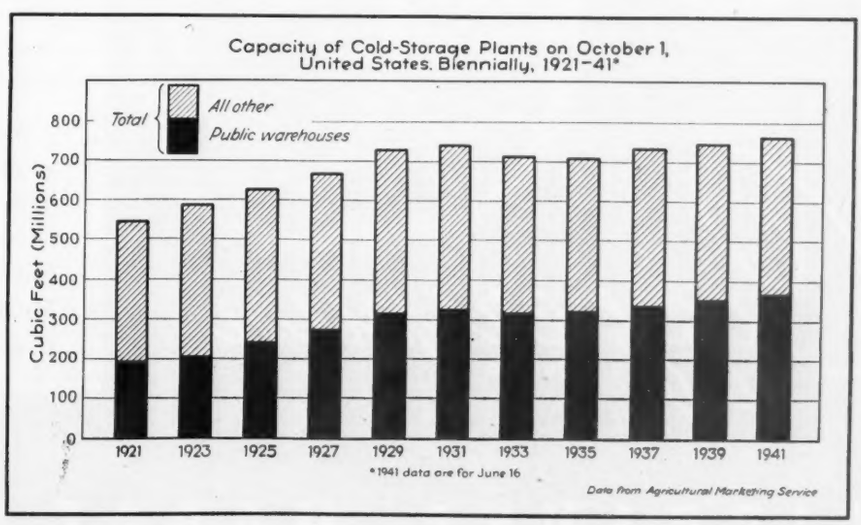
Poultry, all kinds, in frozen storage on the first day of 1942 was 218,374,000 lb. This compares to 208,365,000 lb. a year earlier and to a 1937-1941 average of 165,300,000 lb. for the date.

Meat, all kinds, in cure and frozen storage on January 1, 1942, totaled 717,625,000 lb., compared to 870,042,000 lb. on January 1, 1941, and to an average of 722,505,000 lb. for January 1 in 1937-1941.

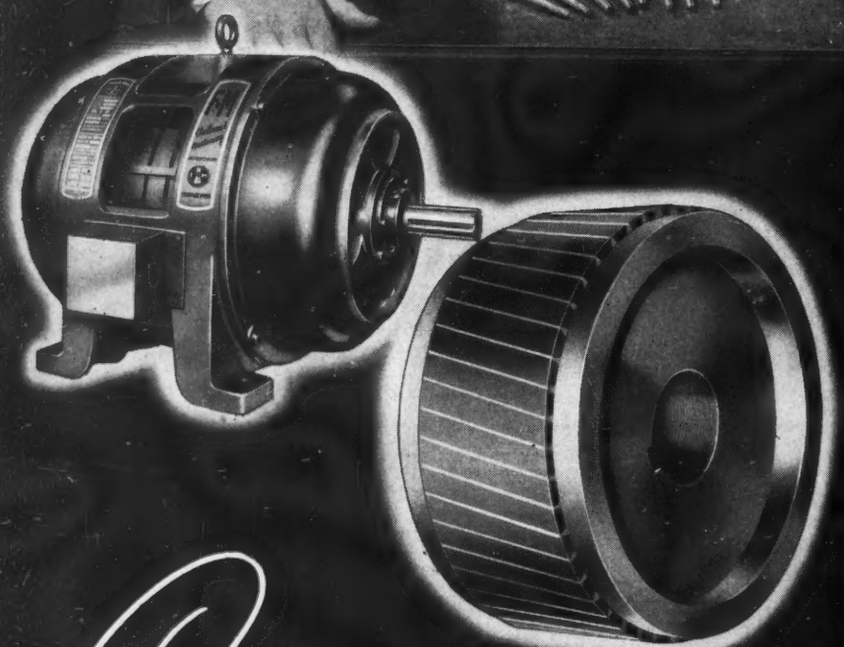
Lard in storage January 1, 1942, was 180,463,000 lb. and rendered pork fat on the same date totaled 4,982,000 lb. The combined figures for these two products on January 1, 1941, were 287,009,000 lb., and the average January 1 figure in 1937-1941 was 152,619,000 pounds.

Weekly wholesale food price index of Dun & Bradstreet rose to $3.42 at the end of 1941, the highest figure recorded since February, 1929.

Business activity index of **Business Week** stood at 163.4 on January 10, 1942, compared to 164.2 a month earlier and to 143.0 for the corresponding 1941 date.



Look Beyond the TRADE-MARK ...Look at the MOTOR!



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INDUSTRY

Amendt Milling Co., Monroe, Mich., has begun full operation of its new flour plant, rebuilt at a cost of $115,000 after it was destroyed by fire in January, 1941. The new mill is of brick construction.

American Meat Institute, Chicago, has issued a booklet, "Buying Guide to the Thriftier Cuts of Meat," suggesting 83 possible meat cuts.

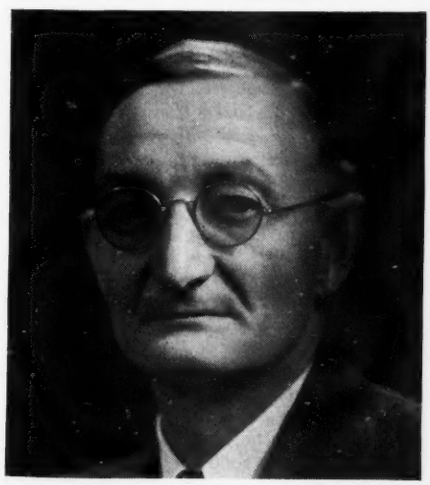
British Columbia Packers, Ltd., Vancouver, B. C., has taken over operation of the Ogden Cold Storage plant at Victoria, B. C., which was formerly operated by Island Freezing & Packing Co., Ltd.

Coleman Packing Co., London, Ont., will award contract for a $50,000, three-story addition to its plant in that city.

Corn Products Refining Co., Chicago, will build a $100,000, one-story, 150 x 200-ft. addition to its plant in Argo, Ill.

Country Gardens, Inc., Gillett, Wis., plans to construct a new branch factory at Walworth, Wis., with buildings and equipment estimated at $100,000.

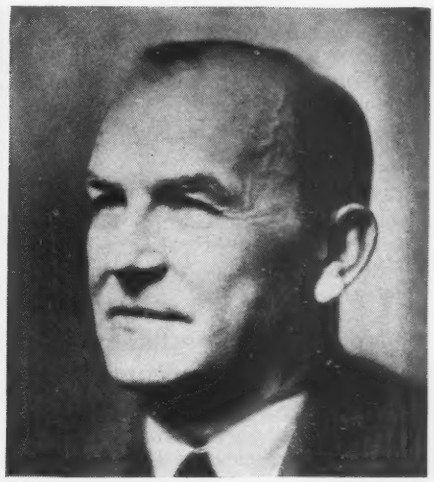
Eureka Produce Co., Harrison, Ark., which ships frozen poultry and dairy products to eastern markets, is completing a cheese factory at its plant, installing cheese-making equipment of large capacity.



DR. ROSS AIKEN GORTNER

Dr. Gortner, chief in the agricultural biochemistry division, University of Minnesota, will receive the Osborne Medal, awarded by American Association of Cereal Chemists for distinguished service in conducting research and training students in cereal chemistry. Dr. Gortner has carried out significant research on the gluten proteins of wheat.

JAMES S. ADAMS



THOMAS L. SMITH

Standard Brands, Inc., has elected James S. Adams, former executive vice-president of Colgate-Palmolive-Peet Co., as president and chief executive officer, succeeding Thomas L. Smith, who becomes chairman of the board and will act in an advisory capacity. Mr. Adams has also been connected with Johns Manville Co. and with Benton and Bowles, Inc.

Fairmont Creamery Co., Omaha, Neb., has opened a cheese manufacturing plant at York, Neb., in cooperation with the government's call for greater production of cheese for Lease-Lend shipment. Operations will require 25,000 lb. of milk per day.

Great Atlantic & Pacific Tea Co. has awarded contracts for construction of a three-story and basement addition to its Syracuse, N. Y., warehouse and distributing center. The new unit will be 100 x 100 ft., to cost more than $75,000 with equipment.

Lamb Fruit Co., Milton-Freewater, Wash., suffered loss estimated at $15,000 when fire damaged its cold storage plant, destroying more than 100 cars of apples and equipment.

John Morrell & Co. is promoting the sale of U. S. Defense Savings Stamps by furnishing 10-cent stamps to 30,000 school children in Topeka, Kan., Sioux Falls, S. D., and Ottumwa, Ia., as an incentive to defense savings.

Riverbank (Calif.) Canning Co. has bought controlling interest in the Florida Grapefruit Canning Co., Bradenton, Fla. D. J. Salomone will be president of both firms.

Shedd Products Co., Detroit, has purchased the business of Belmont Laboratories, Ft. Wayne, Ind., manufacturers of grocery specialities.

Sheridan (Wyo.) Creamery has completed plans for establishing a cheese factory in Sheridan, scheduled to open on April 1. J. Oviatt is manager.

A. E. Staley Manufacturing Co. plans to erect a corn and soybean oil refinery costing $150,000 at Decatur, Ill.

Stokely Brothers & Co., Indianapolis, is constructing a $100,000 canning and processing plant in Houston, Tex.

United Packing Corp. is establishing a new canning business in Bainbridge, Ga., with an authorized capital of $20,000, to specialize in okra, tomatoes, field peas and blueberries.

Washington Cooperative Egg & Poultry Association, Tacoma, Wash., has added a dogfood processing department, packing the product under the "Blue Cross" label, in 15½-oz. tins. J. W. Walker is general plant superintendent.

Wesson Oil and Snowdrift Co., Inc., will build a three-story processing plant of modern concrete construction, in New Orleans, at a cost of $225,000 with equipment.

Wilson and Co., Chicago, plans to build an addition to its meat processing plant at a cost of $40,000.

PERSONNEL

George B. Beitzel, manager of sales, Pennsylvania Salt Manufacturing Co., has been named vice-president in charge of sales.

W. Howard Chase, former associate editor of the Whaley-Eaton News Service, Washington, D. C., has become director of the Public Service department of General Mills, Inc.

H. T. Cumming, Curtice Brothers Co., Rochester, N. Y., has been elected president of the Association of New York State Canners, Inc., succeeding W. E. Halstead.

W. R. Dowrey, one-time head of Piggly-Wiggly Co. in British Columbia, has been named regional director of the Wartime Prices and Trade Board at Vancouver, B. C.

William Hagenmeyer, vice-president of Commercial Milling Co., has been appointed president of Michigan Bakers Allied Trades Association.

G. V. Hallman, chief bacteriologist of Continental Can Co. research laboratories, has been named 1942 chairman of the Midwest section of Institute of Food Technologists.

Charles B. Hill, Jr., plant superintendent, and Herbert B. Taylor, sales manager of Northwestern Yeast Co., with Hays MacFarland, president of MacFarland Aveyard & Co., advertising agency, have been named to the board of directors of Northwestern Yeast Co.

Frank W. Meyer, special trade relations representative of Standard Brands, Inc., has retired. He will, however, continue as chairman of the transportation committee of the National Association of Retail Grocers.

A. C. Monagle, vice-president of Standard Brands, Inc., has retired from active business. He was formerly with Royal Baking Powder Co. as sales manager, and has been active in trade associations for a number of years.

Robert P. O'Brien, vice-president of McMillen Feed Mills and Central Soya Co., Fort Wayne, Ind., since 1934, has become vice-president of the commercial feed division, Pillsbury Flour Mills Co., with headquarters in Minneapolis.

J. H. Randolph, general manager of Imperial Ice Cream Co., Parkersburg, W. Va., has been reappointed to the executive committee of International Association of Ice Cream Manufacturers.

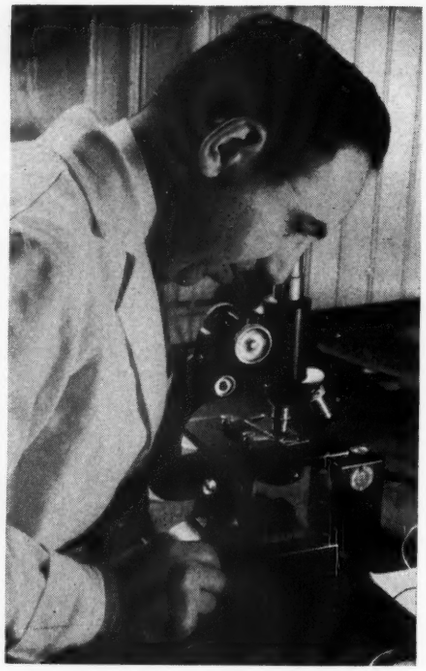
Frank F. Rennie, Jr., president of Virginia Dairy Co., Richmond, Va., has been named a member of the Dairy Industry Defense Advisory Committee.

Morris Rosenthal, formerly of Stein, Hall & Co., New York, N. Y., is now assistant director of the Board of Economic Warfare, Washington, D. C.

R. W. Starman, research biologist, Chicago laboratories of Swift & Co., has become chemist-in-charge at the company's Omaha plant.

G. J. Steinhardt has purchased the Shawano, Wis., branch of Chippewa Cheese Corp.

Theodore L. Sweet, Rumford Baking Powder Co., has been granted leave of absence to accept the post of priority specialist, Food Division, Purchasing Department, OPM.



DR. S. S. EPSTEIN

Kirsch Beverages, Inc., Brooklyn, N. Y., has announced that Dr. S. S. Epstein, chemist, has been appointed a vice-president of the company.

Stanley Talbott, formerly connected with the merchandising divisions of Bethlehem Steel Corp. and General Electric Corp., has been named merchandising manager of Dr. Pepper Co.

Harry Wolf has been elected manager of William Freihofer Baking Co., Allentown, Pa., succeeding John A. Herman, retired.

DEATHS

Harry Baron, president of Harry Baron & Co., Inc., Linden, N. J., manufacturers of jams and jellies, Dec. 18, in New York.

Ralph M. Clutton, 53, purchasing agent for National Sugar Refinery, Edgewater, N. J., Dec. 20, in Yonkers, N. Y.

Henry T. Gordon, 68, executive of Quinn and Nolan Brewing Co., Jan. 4, in Albany, N. Y.

Raymond M. Grennan, 39, president of Farm Crest Bakeries, Inc., Detroit, leaped to his death Dec. 25 when he was trapped by a fire in his room in a Detroit hotel.

Frank R. Jordan, 70, treasurer of Boston Molasses Co. and president of the American Molasses Co. of Maine, Dec. 26, in Portland, Maine.

John P. Klinkert, 52, president of the Klinkert Candy Co., Jan. 1, in Milwaukee.

Lewis E. Munger, 58, president of Holley (N. Y.) Canning Co., Dec. 23. Mr. Munger was a past president of the New York State Canners Association.

William F. Rayhill, vice-president of Rochester (N. Y.) Packing Co., Dec. 31, in Rochester.

Emil Schlichting, 67, president and manager of National Brewers Academy and Consulting Bureau, Dec. 28, in Bronxville, N. Y.

Charles F. Todd, 85, head of J. H. Todd & Sons, Ltd., operators of several Dominion canneries, Dec. 24, at Victoria, B. C.

ASSOCIATED INDUSTRIES

Allis-Chalmers Manufacturing Co. has elected Max W. Babb, president, as chairman of the board. W. C. Buchanan succeeds him as company president.

Aluminum Co. of America, Pittsburgh, Pa., has produced an educational Technicolor sound film which tells the story of aluminum in an entertaining manner. The film, "Unfinished Rainbows," made by Wilding Picture Productions, Inc., is available for showing to groups.

Alvey-Ferguson Co., Cincinnati, Ohio, has increased production capacity by 25 percent by recent completion of a new plant, first unit in a large program.

Dairy Industries Supply Association has elected as president Gordon Lamont, secretary of Lamont, Corliss & Co., and vice-president of DISA. He succeeds Harry L. Miller, president of Chester Dairy Supply Co.

Jenkins Brothers, New York, N. Y., manufacturers of valves, announces that it has materially increased production capacity of Corrosion-Resisting Alloy Valves, so that it can offer faster delivery on these valves for orders having high priority ratings.

Lester D. Kehoe Machinery Corp., New York, N. Y., has been formed to continue the handling of milk, ice cream, food and chemical processing equipment formerly conducted as a department of the Robert P. Kehoe Machinery Co.

National Can Corp.'s new manufacturing plant in Chicago is nearing completion. Located near one of the nation's greatest food-growing regions, the plant will soon begin to supply cans to the trade.

Novadel-Agene Corp., Newark, N. J., division of Wallace & Tiernan Co., Inc., has purchased the flour and bleaching patents, assets and goodwill of Superlite Co., Dallas, Tex.

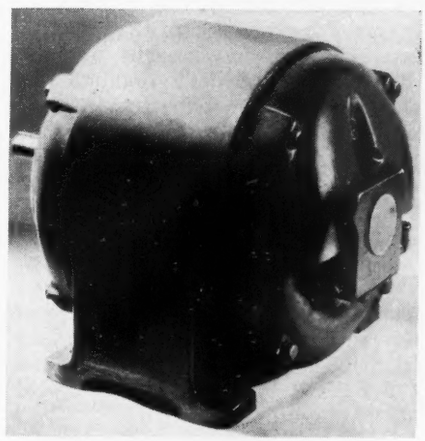
Packaging Institute, Inc., has elected as president Joel Y. Lund, vice-president of Lambert Pharmacal Co., St. Louis, to succeed George R. Webber of Standard Brands, who died on Nov. 1.

Dr. H. H. Sheldon, formerly professor of physics at New York University, has established a consulting office at 100 East 42 St., New York, N. Y.

FOOD EQUIPMENT NEWS

Protected Motor

ALLIS-CHALMERS MANUFACTURING Co., Milwaukee, Wis., has brought out a new line of motors called the "Lo-Maintenance" motor. A feature of these motors is the "Safety-Circle" protection. This consists of a wide, solid rib, integrally cast as part of the frame, which forms an unbroken circle of protection around the stator. The frame is a one-piece casting and combined with the cast end shield is said to guard the motor from exterior knocks and abuse. The manufacturer also states that a more liberal use of electric materials makes this motor internally and electrically stronger because current and magnetic density are less extreme. An additional advantage is said to be improved bearing design which delivers smoother performance with full flow lubrication and easier maintenance. Additional cross strength has been built into the distortionless stator for maximum power efficiency. The rotor is keyed to the shaft for strength, its outer surface is turned for smoothness and accuracy of air-gap. Other features claimed for the "Lo-Maintenance" motor are oil drains at the bottom of the bearing for easy flushing, removable end brackets, and large conduit box for easy wiring.



New "Lo-Maintenance" motor

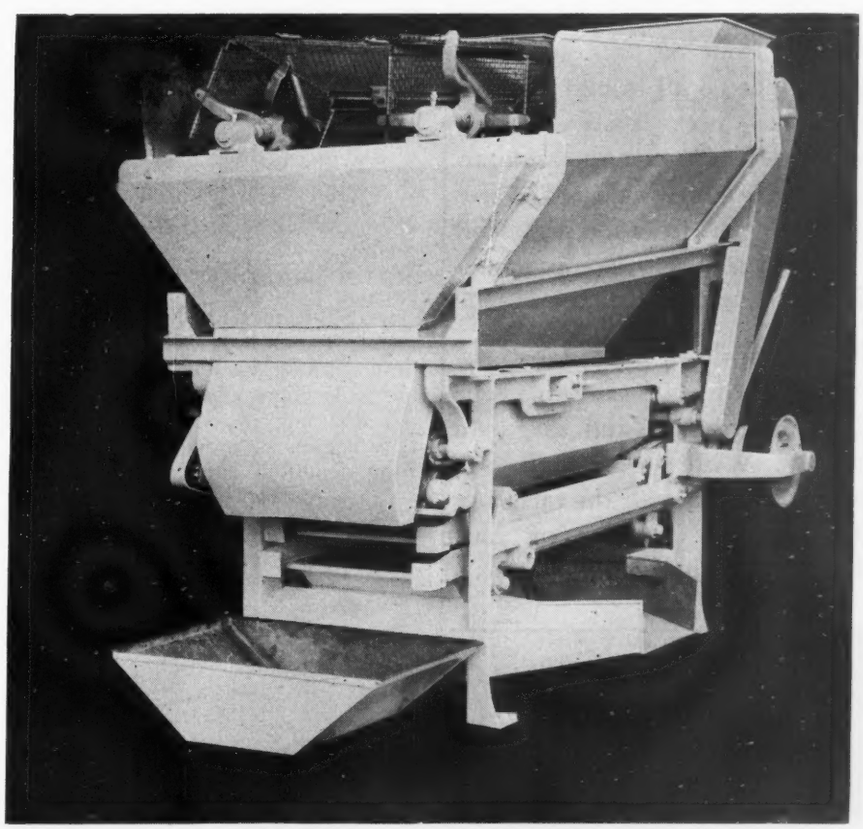
Corn Silker for Canners

FOOD MACHINERY CORPORATION, Hoopeston, Ill., has brought out the Model 8 corn silker with double cob reel for removing the silk and cleaning corn in corn canning plants. The machine is adapted to cleaning either whole kernel or cream style corn. In this machine, the cob reel or drum that removes pieces of cob, some of the silk, ribbons of husk and so on, is rectangular rather than round, with all four sides easily removable from the frame. It is said that this design retains all of the operating advantages of the previous cylindrical screen, but eliminates the tendency of the corn to "ball up". The screens are flat, and therefore, are said to be more durable and easier to clean than a cylindrical screen, because they can be removed from the frame without difficulty.

The manufacturer states that the higher output of this machine results in large part from the use of the double reel. Because the double reels are driven separately, one can be stopped for cleaning, while the corn flow is diverted to the other. In this way, the flow of corn through the machine is never interrupted.

Another feature of this new silker is the four crosswise rows of traveling wires below the cob reels in the center of the machine. These collect silk and refuse. Carried on endless chains, these wires constantly pass through the corn as it drops from the reels to the shaker screen. Silk and refuse is removed from the wires by a revolving brush at the front of the machine.

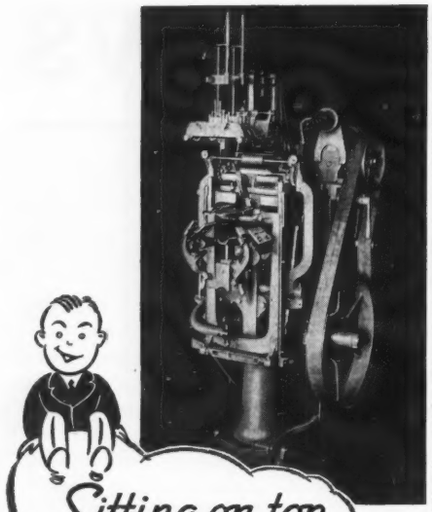
Also, the lower screens of this machine throw as well as shake the corn. They move forward and backward and agitate up and down. These pieces, together with the hopper worm feed that insures a steady flow of corn, deflectors below the revolving screen to distribute the corn evenly, and the easy removability of all parts for cleaning, are claimed by the maker to fit the Model 8 silker to the requirements of the highest speed canning line.



Silker with double cob reel for corn canning line.

Pressure Gage

BROWN INSTRUMENT Co., Wayne & Roberts Ave., Philadelphia, Pa., has brought out a rectangular case Bourdon tube pressure gage, to match its line of other rectangular case instruments. This gage has a patented "Recalibrator," providing a means for accurately setting the pen on zero, also a micrometer zero adjustment on the pen arm itself. Because of the design, consisting of a



Manufacturers who apply labels to a variety of container sizes and shapes are sitting pretty when they turn their labeling problem over to the WORLD Model S Semi-Automatic Labeler.

This easy-to-operate Model S is World's most flexible labeler. It applies front or back labels or labels that go all 'round the bottle; body, neck labels and foil, separately or in one operation, to containers of every shape and size from tiny jars to gallon jugs. And it does a neat, accurate, economical job on all of them.

Why not find out how the WORLD Model S can solve your labeling problem and save you money. Write for Bulletin S-8, and if you want all the facts and figures send us a set of your labeled containers.

ECONOMIC MACHINERY CO.

WORCESTER, MASSACHUSETTS

one-piece casting supporting the Bourdon tube, the gear and pinion, and the pen arm shaft, the whole assembly is installed in the case as one completely calibrated unit.

Grinding Equipment

PRATER PULVERIZER CO., 1825 S. 65th Ave., Chicago, has brought out the "Prater Advance Series" grinding mills. These mills are in four sizes, from 30 to 75 hp. motors, and are available equipped with a wide variety of screens and rotor equipment for grinding a wide variety of materials.

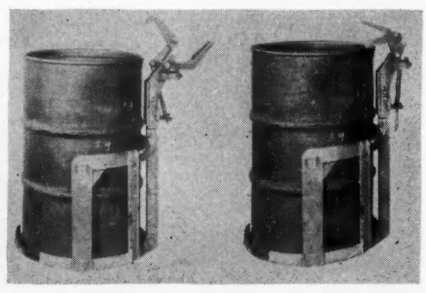
The main features are embodied in the action of the built-in Prater crusher-feeder. There is also an improved system of air handling carried throughout the entire mill. The crusher feeder takes rough material, reduces it in size and feeds it to the final grinding element in a uniform flow.

The material is next underfed through a baffle air screen that removes foreign materials such as tramp iron before it passes to the crushers of the final grinding process. The final crusher consists of a number of units mounted on a reduced diameter of the rotor. They are small, heavy and closely spaced.

The material is carried from this final grinding section to a final sizing section by a combination of the force of the crushers and the following flow of air. In the final sizing section, the force of the incoming air added to air pressure generated by the revolving blades on the rotor produces an air flow through the screen that removes all materials that are ground to size. The rotating hammers themselves work close to the surface of the screen and all unground material is carried off at each revolution.

Barrel Dumping Harness

LEWIS-SHEPARD SALES CORP., 245 Walnut St., Watertown, Mass., has brought out a quick-locking harness to speed up and make more efficient the handling and dumping of barrels and drums. This harness is arranged to have the drum deposited directly in it from a Lewis-Shepard barrel hoop truck, so that it does not have to be placed on the floor first—thus eliminating one operation. The harness is made with a spring toggle and is said to permit speedier work in the dumping of these large containers.



Quick-locking harness for dumping barrels or drums

Paste-Type Colloid Mill

BASED on the triple action of its design of colloid mill, described in FOOD INDUSTRIES, May, 1941, p. 108, C. O. Bartlett & Snow Co., Cleveland, Ohio,

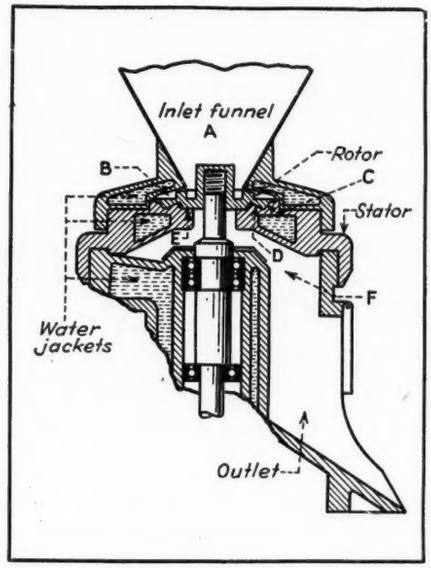


Diagram of colloid mill for use on heavy pastes and similar materials.

has brought out a "Paste-Type" colloid mill. This is for the purpose of producing heavy colloid dispersions. The machine is said to minimize aeration and foaming and to produce excellent disintegrations and dispersions of materials such as pastes and other semi-solids.

Referring to the accompanying illustration, material enters through the inlet *A* and immediately encounters the vanes on the top of the rotor *B*. These premix the material and carry it to the periphery of the rotor at high pressure, forcing it downward, then upward between the machined surfaces of the rotor and stator (*C* and *D* on the diagram, the first and second processing actions). The material is crowded into constantly smaller areas as it approaches the center and is forced across the flat area *E* between rotor and stator, the third processing action. Thence the material is discharged through *F*, the outlet.

The gap between the rotor and stator is adjustable to and calibrated in 0.001 in. Material of construction can be suited to requirements of process. Provision is made for cleaning, sterilizing and inspection, and it is said that the

mill can be disassembled in less than three minutes.

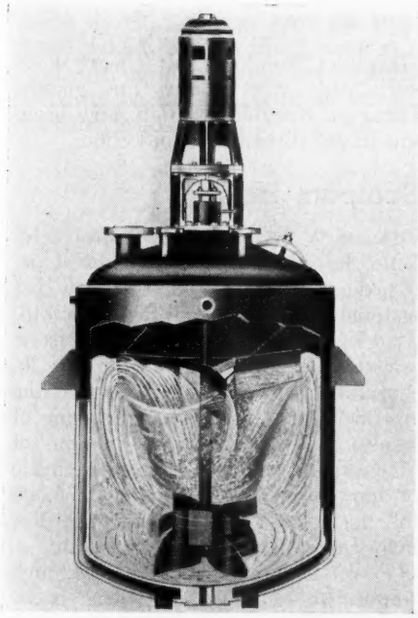
Midget Dough Roller

ANETSBERGER BROS., 3322 Elston Ave., Chicago, Ill., have added a "Midget" dough roller to their line. This roller occupies a floor space 24x24 in. and is designed to handle straight, sponge, rolled-in, retarded doughs, pie dough, puff-paste and many other products. The rollers are 18 in. wide by 3¼ in. in diameter and are of polished cast iron. They are designed for adjustment of the opening from zero to 1 in. These rollers are equipped with steel self-cleaning scrapers, inclined feed plate for facilitating delivery and a safety device that shuts off current before hands can be caught in the rollers. The drive is from a ¼ hp. motor to a V-belt. The roller frame is of heavy cast iron with a steel, electrically-welded cabinet finished in white baked-on enamel.

Mixing Unit

BLAW-KNOX CO., Pittsburgh, Pa., has developed the "Rotoflo," for agitating or mixing liquids, liquids and solids, or liquids and gases.

This unit consists of a jacketed shell designed for "Dowtherm" heating; an



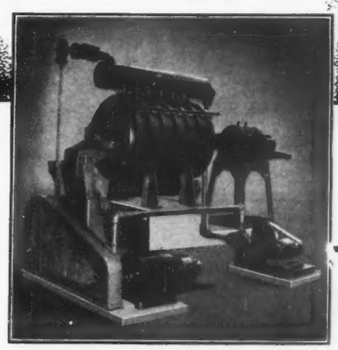
New type mixer uses baffles combined with rotor to speed action.

agitating rotor, driven by motor through a speed reducer; and a set of baffles. The baffles are a feature of the design and provide a "cataract" surface action at any liquid height, with the purpose of improving efficiency and inducing rapid gas absorption.

The agitator rotor is designed with upper and lower segments to each blade.

VILTER PAKICE Equipment

Will PAY FOR ITSELF in YOUR Plant, too!



Many Meat Packers and Food Processors have paid for their new Vilter PAKICE Equipment out of actual savings . . . Savings in ice cost (as much as 70%) . . . Savings in time and labor . . . Savings in perishable foods, too, because of better refrigeration from slow-melting PAKICE . . . Savings in equipment, because PAKICE has no large, hard lumps to damage or dull grinder knives, as in sausage making.

FIND OUT how much PAKICE will save in YOUR Plant. The coupon will bring you facts and figures. Check it TODAY!

VERTICAL Type VILTER PAKICE Equipment

Available in units of ½, 1, 2½, and 5 tons daily capacity, with storage bin. Illustration above—½ ton unit, completely self-contained.

HORIZONTAL Type VILTER PAKICE Equipment

Available in units from 15 to 30 tons daily capacity in 5-ton increments. Illustration above—30-ton unit with Briquette-making attachment. Floor space—less than 9 x 12.

● *Tear off and return for* **YOUR** *story of* **PAKICE** *Savings* ●

THE VILTER MFG. CO.
2115 S. First St., Milwaukee, Wis.
Please send us more details on SAVINGS with VILTER PAKICERS to fit the following conditions:

Amount of Ice used: Daily..... Annually.....

Water: Temperature ..... Cost .....

Power: Volts..... Ph. ..... Cycle..... Cost per K. W. H.....

Present cost of Ice per ton.....

Name ....

Address ....

City..... State.....

Superior Since 1867 VILTER Refrigeration... Air Conditioning

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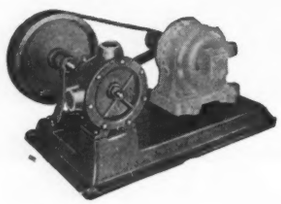
Offices in Principal Cities

NO PRIORITIES ON THE CORRECT ANSWER TO PUMPING PROBLEMS



Under present conditions, with priorities in effect on all types of machinery, the correct answer to your pumping problem is doubly important. You can't afford to gamble.

Today, more than ever before, pumps must DELIVER. So industry depends on Viking Rotary Pumps, backed by their long record of rugged, trouble-free performance.

If you have a pumping problem, tell us about it. We'll do our best to help you. Our Viking installation and maintenance booklet free on request.

Figure 53 — pictured above — is a V-belt motor driven unit. Furnished in bronze, bronze-fitted or all bronze construction. Available in capacities of 5 to 1050 GPM. Belt guard furnished as standard equipment. Complete information in Bulletin 103. Write for it.

VIKING PUMP CO.
CEDAR FALLS, IOWA

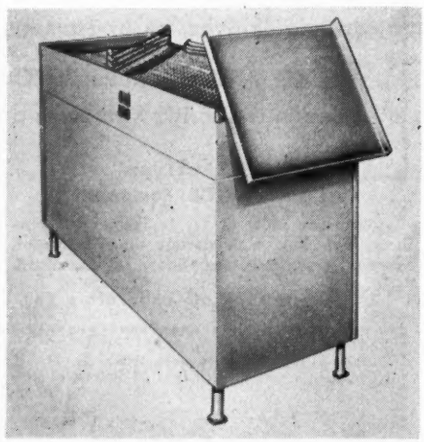
This rotor swirls the mass of the liquid, creating a central vortex, while the surf-riding baffles divert the top part of the rotating fluid, plunging it into the vortex. Thus top to bottom circulation is produced, and increased surface contact area is combined with high rotational velocity. The result is said to be intimate mixing in a minimum time.

Unscrambling Table

A NEW TYPE of unscrambling table, the "Styl-O-Matic" straightline unscrambling table, for taking cartons of empty containers and feeding them one by one to the filling line, has been developed by Island Equipment & Supply Co., Inc., 101 Park Ave., New York City. This infeed and unscrambler is designed to replace the rotary type used in many plants. In such use, the manufacturer claims a saving in floor space, increased production and reduction in the danger of bottles falling over and breaking. In addition, it is said that the table gives a positive discharge.

In design, the apparatus consists essentially of a broad, three-strand chain-belt conveyor, operating along a relatively narrow structure and equipped with a discharge gate to feed the bottles to the line conveyor. At the intake end, the device is equipped with a tilting table.

In operation, the operator tilts this tilting table downward away from the infeed, upturns a carton of containers on the table, and then tilts it back so that it slopes slightly toward the moving belt. The entire carton is then removed and the containers move onto the moving belt and along the unscrambling table. Carton dividers can be held in the carton by the operator, or may be lifted off the table after the bottles are removed from the carton.



Infeed and unscrambling table said to eliminate breakage of glass containers.

Advantages claimed for this method of operation include the fact that the operator does not need to handle the containers and thus the sanitary conditions of the operation are improved. Also, because the bottles do not need to be taken out of the carton by hand and transferred to the conveyor, much breakage is avoided.

This unscrambling table comes in two sizes. The single style will handle from 50 to 150 containers per minute with one operator, while the twin size will handle from 120 to 300 per minute with one or two operators.

Non-Skid Work Shoe

SPERRY SHOE CO., 15 Main St., Beacon Falls, Conn., has added to their line of safety work shoes using the Sperry "Top-sider Non-Skid Sole", work shoes embodying steel safety toe guards. These are available in a 6-in. high black and in an all black Oxford shoe.

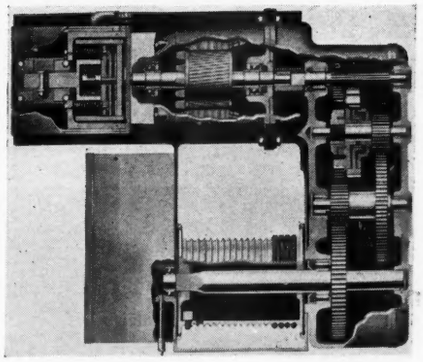
Work shoe with non-skid sole and steel safety toe cap.

Compact Hoist

ROBBINS & MYERS, INC., Springfield, Ohio, has developed a steel hoist designed to provide efficient, low-cost materials handling for all types of industry. Known as the F-½, this hoist is available in 1,000 lb. and 2,000 lb. capacities. The design is compact, the aim being to occupy a minimum of headroom space with a maximum of lift power. Gears and shafting are made of alloy steel of approximately 278,000 lb. per sq.in. tensile strength. The main frame is of welded steel plate.

Power is supplied by R. & M. high torque hoist motors. Control is by means of push-button pendant with single or two speeds for polyphase current. Provision is also made for 110–220 volt, single phase current.

The load brake, incorporated in the hoisting gears, automatically controls speed when the load is lowered. If power fails, the brake prevents the load from dropping. The hoist drum is fabricated from steel pipe and flanges, and is welded and machined. Entire lift of the hoist is provided without overwind of the cable. This hoist can be applied



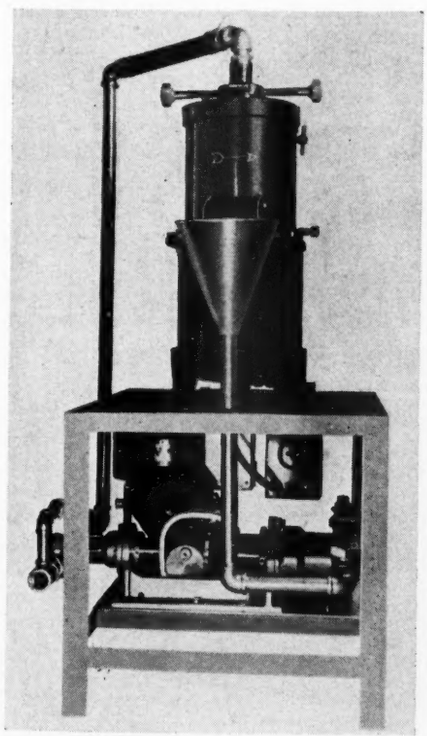
Cut away view of R. & M. hoist, showing motor, gearing, brake and drum.

to any make of monorail. Motor driven trolleys with speeds of 60 to 100 ft. per minute can be provided.

Mustard Mill

JAYHAWK MFG. CO., with a factory at 126 E. 2nd St., Hutchinson, Kans., and sales offices at 711 West Chickasaw St., Oklahoma City, Okla., has developed the "Jayhawk" precision mustard mill. This mill combines the principles of carborundum grinding and colloidal dispersion and emulsion. This is said to insure a smooth product.

The new mill occupies less than 3 sq.ft. of floor space, weighs less than 600 lb. It is driven by 5 hp. motor, and is said to do as much work as two large stone mills occupying 32 sq.ft. of floor space, weighing ten tons and using 15 to 20 hp.



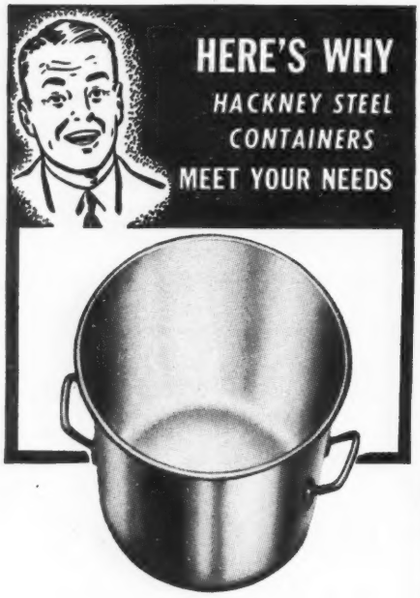
"Jayhawk" mustard mill requires but small space

PROTECTION
AGAINST VERMIN

Products in Bemis Waterproof Bags seldom are damaged by vermin. Since such pests cannot smell the contents through a Bemis Waterproof Bag, they are not tempted. Even the materials of a Bemis Waterproof Bag are objectionable to vermin!

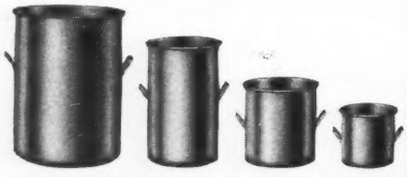
These Bemis Shipping containers can be made to keep moisture in and dampness out —retain desirable aromas and repel objectionable odors—shut out dust and dirt—resist acids and grease. And because of their strength and toughness, Bemis Waterproof Bags provide extra protection against rough handling.

WATERPROOF DEPARTMENT
BEMIS BRO. BAG CO.
ST. LOUIS, MO. • BROOKLYN, N. Y.



First of all, you need a container that is sanitary—easy to clean and keep clean. Then, it must be durable—able to stand up under exceptionally hard use. Hackney *Seamless* Steel Containers meet those requirements. They're cold-drawn to shape—not a weld or joint in their entire construction. The bottom is reinforced with a wearing ring. For long life, appearance, and cleanability, they head the list. Food product manufacturers are using them for holding foodstuff, liquids, chemicals, ice, etc., as well as for food scraps . . . for inter-department handling of raw products during manufacturing processes.

IN ALL POPULAR SIZES



Your plant, too, can benefit by using Hackney Seamless Steel Containers. All popular sizes are available—5 to 60 gallon capacity, galvanized, tinned or black. Write for full details today.

Hackney
MILWAUKEE

PRESSED STEEL TANK COMPANY

1349 Vanderbilt Concourse Bldg., New York
208 So. LaSalle St., Room 1573, Chicago
669 Roosevelt Bldg., Los Angeles
1457 So. 66th St., Milwaukee

Containers for Gases, Liquids and Solids

The mill and all contact parts except the grinding plates are made of 18–8 stainless steel, which is precision machined. Grinding plates are adjustable to grind to any desired fineness and it is claimed that such adjustment is held over many hours of steady operation without the slightest variation in fineness or output and without attention.

The grinding plates are said to be good for more than 200,000 gal. production and can then be replaced in 15 minutes time at moderate cost. Among the other advantages claimed for the mill are the minimization of loss of strength of product through vapor leakage, easy adjustments of feed pump while pump is in operation, and minimum of attention during operation.

Liquid Cooling Systems

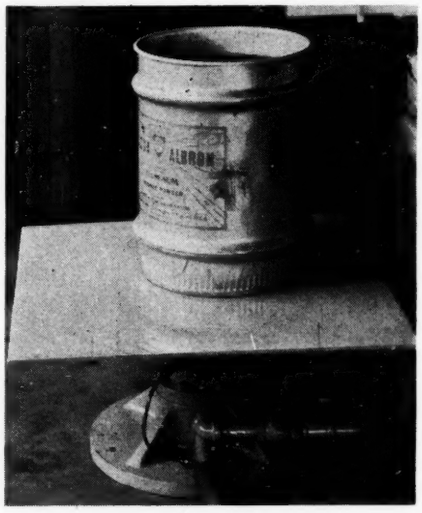
Worthington Pump & Machinery Corp., Harrison, N. J., has developed a line of liquid cooling systems for use with air conditioning installations and process refrigeration installations. This embodies a centrifugal compressor of the volute design rather than of the diffuser design formerly used with centrifugal refrigerators.

The manufacturer claims for this equipment many new and unusual features including dual lubrication, and balancing of end thrust and side thrust by arrangement of impeller and volute. Equipment is available in a wide variety of sizes covering a range from 150 tons refrigeration effect to 1200 tons.

Installations of this equipment so far made have been in "blackout" plants and in plants needing controlled temperature for precision manufacturing.

Hydraulic Jolter

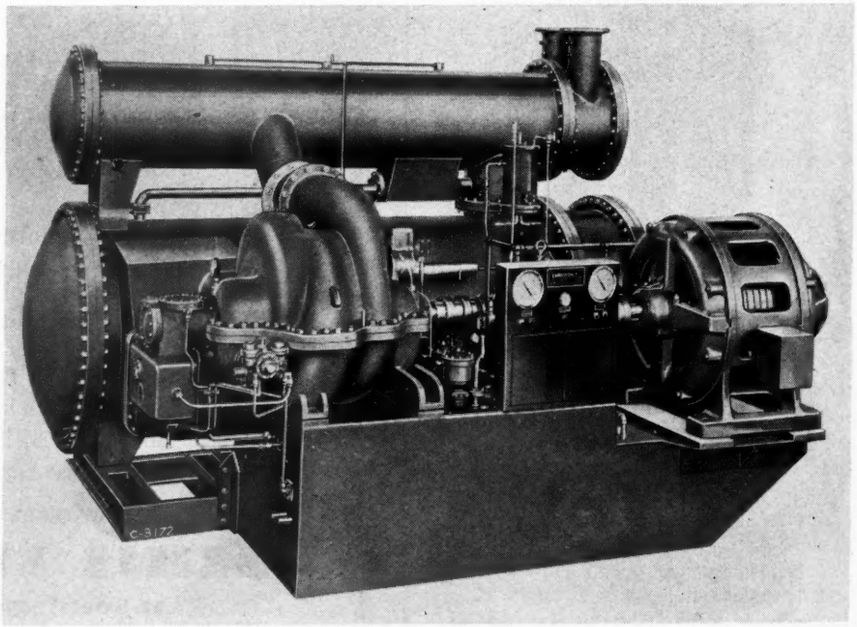
Syntron Co., Homer City, Pa., has placed on the market a line of water-powered jolters or packers for settling powdery materials packed in barrels,



Hydraulic jolter for packing light, fine, powdery materials in conveyors

drums, or other containers. The machine embodies a deck plate on which the container is placed, and an hydraulically operated cylinder which lifts the plate and drops it with a sharp jolt approximately once every second.

Both frequency of jolts and height of plate lift are controllable by regulating the water line. The hydraulic motor requires about 50 lb. water pressure. Where lower pressures only are available, a small electric motor driven pump with a closed circuit can be supplied to operate the jolter.



Centrifugal refrigeration equipment for liquid cooling system.

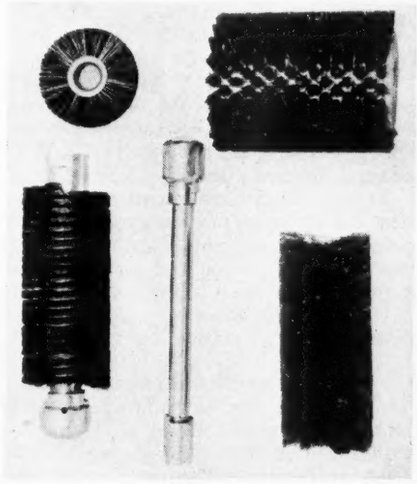
Five-Way Unit Heater

CARRIER CORP., Syracuse, N. Y., has developed a new type of unit heater designed to provide quick and economical heating for industrial and other buildings. Designated the "Five-Way" unit heater because of its ability to discharge heat in five directions, outward, forward and downward, the equipment is said to combine great flexibility, great floor coverage and ability to heat from elevated positions.

This heater is available with steam or hot water coils, and is of the suspension type. The direction of air discharge may be at any angle with adjustment by means of louvres in the outlets. Independently adjustable, each louvre may be set to deflect air streams to obtain desired heat coverage.

Cleaning Brushes

NATIONAL ELECTRIC MANUFACTURING Co., 60 E. 42nd St., New York City, has placed on the market a new line of power brushes which is claimed to cut the cost of brushes considerably by eliminating the purchase of hardware with each brush. This has been made possible by the development of a brush adapter to accommodate various



Adapter and several brushes arranged for use with it.

skeleton, spiral, and wood core brushes.

The adapters are of precision manufacture in order to eliminate vibration and uneven wear of the brush and to protect the cleaning equipment. They are made for solution feed and also without the feed, and are adaptable to all standard equipment, making it possible to assemble them in a few seconds by sliding on the various diameter spirals, sections or cores of brushes. The manufacturer states that one adapter will serve the average plant's entire requirements and will substitute for the hardware which might be supplied with thousands of brushes.

FOOD INDUSTRIES

HELPS **YOU** WRITE MORE ORDERS

● FOOD INDUSTRIES takes the story of your company and your line of products directly and economically to the men in worthwhile food plants who you must sell. And it doesn't drop that important message of yours in their laps without introduction or explanation, either. FOOD INDUSTRIES delivers your sales message *by request* in an attractive package accompanied by editorial matter that conditions your customers to thinking in terms of new equipment, materials and supplies which you make and which will help them improve their products and processes.

● For example, FOOD INDUSTRIES' editors pioneered the Unit Operations Concept of food manufacturing. They showed food men in each branch of the field how to profit by the discoveries, experiences and practices of manufacturers in other branches. This broader viewpoint has bound the food industries together into one BIG market for you — a market that can be reached profitably through one publication — FOOD INDUSTRIES.

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BOOKLETS • LITERATURE • BULLETINS

FOOD PLANT EQUIPMENT

Conveyor Mesh Belting—In a 132-page illustrated catalog, the use of various types of woven wire belting for the conveying and processing of foods and other products is discussed, with specifications for various types of belts and a section on conveyor design, by The Cambridge Wire Cloth Co., Cambridge, Md.

Cooling Coils—Coils for cooling air, gases, water and other liquids in many types are described and specifications given in 68-page illustrated Bulletin DS-365, which also includes sections on the engineering of coils, published by Trane Co., La Crosse, Wis.

Liquid Processing Equipment—"Hy-Speed" equipment for the processing of liquids, including agitators, mixers, filters, tanks, pumps, also bottle fillers, cappers and labeling equipment, is described and illustrated in 36-page catalog Form 941 published by Alsop Engineering Corp., Milldale, Conn.

Meat Processing—In a 74-page bulletin entitled "This is the Tenderay Process", the method of aging and tenderizing meat using the Sterilamp to inhibit the molding and spoilage of the product is thoroughly described and discussed by the Lamp Division, Westinghouse Electric & Mfg. Co., Bloomfield, N. J.

Yeast Purifier—The Fischer Pitching Yeast Purifier, a device for producing a biologically clean and vigorous pitching yeast for brewers, made of stainless steel and embodying the operations of screening, washing, aerating and cooling in one device, is described in a leaflet issued as Bulletin No. 10, by Yeast Processing Equipment Corp., 5001 Elston Ave., Chicago.

PLANT SUPPLIES

Belt Drives—Bulletin B-6190, an 8-page illustrated publication entitled "More Power To You," discussing the Super-7 V-Belt for industrial drives, its construction and use, has been brought out by Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Diesel Engines—Four cycle, direct injection, totally enclosed, Type DD diesel engines for power supply, sizes up to 665 hp., are the subject of Bulletin S-500-B38A, of Worthington Pump and Machinery Corp., Harrison, N. J.

Diesel Power—"Modern Installations" is the title of an 80-page pictorial booklet showing pictures, with brief accounts, of stationary diesel installations, many in food plants, issued by Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago.

Heating Units—"Nonfreeze" heat diffusers for industrial heating, a design said to maintain uniform temperatures, eliminate stratification, and prevent coil freezing, are described in a recent publication of Carrier Corp., Syracuse, N. Y.

Insulation—Featuring the fact that over 1,000 frozen foods locker plants have been insulated with "Palco" wool, a 20-page illustrated bulletin on locker plant operation has been issued by Pacific Lumber Co., 100 Bush St., San Francisco, Calif.

Magnetic Clutches—Bulletin No. 225-A is a 20-page catalog on magnetic clutches, and magnetic clutch and brake combinations and their adaptability for near or remote control, issued by Stearns Magnetic Mfg. Co., Milwaukee, Wis.

Seamless Tubing—"Outline of the Metallurgy of Iron and Steel" is the title of an 80-page booklet dealing with the manufacture of iron and steel, particularly seamless tubing, and having chapters on corrosion, alloys and specifications, issued by Globe Steel Tubes Co., Milwaukee, Wis.

Steel Strapping—Use of steel-strapped packages for Lease-Lend and other defense purposes is the subject of Acme Process News, Issue No. 4, published by Acme Steel Co, 2840 Archer Ave., Chicago.

PACKAGING

Container Linings—Protective linings for drums and other steel containers, with selection tables for use with various products, are the subject of a 12-page illustrated bulletin of Ault & Wiborg Corp., 75 Varick St., New York City.

Labeling—"Successful Bottle Labeling" is the title of a 36-page handbook for food processors who pack in glass containers—a general discussion of labeling machines, methods and difficulties—published by National Adhesives Div., National Starch Products, Inc., 820 Greenwich St., New York City.

Container Sealing—Various methods of sealing shipping containers, including the use of adhesives, gummed tape, staples, stitches, wires and straps, together with a general discussion of container sealing, are contained in a 16-page illustrated booklet entitled "Little Packaging Library No. 1" published by Hinde & Dauch Paper Co., Sandusky, Ohio.

CONTROL EQUIPMENT

Canning Controls—Temperature controlling instruments particularly adapted to various applications in the canning industry are described and their application illustrated by hook-up charts in 16-page bulletin No. 12-5, published by Brown Instrument Co., Wayne and Roberts Aves., Philadelphia, Pa.

Control Equipment—Devices for the automatic control of temperature, pressure, liquid level and rate of flow are described and illustrated with specifications in 24-page catalog No. 41 issued by Mason-Neilan Regulator Company, 1190 Adams St., Boston, Mass.

Control Instruments—A 24-page illustrated catalog, with a price list supplement, entitled "Recording Instruments for Temperature and Pressure", describing a new line of 9, 10 and 12 inch chart recording thermometers and recording pressure gages, and also giving data on mercury, fully-compensated mercury, vapor tension and gas filled tube instruments, has been issued as Catalog No. 1210 by C. J. Tagliabue Mfg. Co., Park and Nostrand Aves., Brooklyn, N. Y.

Control Instruments—Mechanical meters for indicating, recording, integrating and controlling flow and liquid level, are described and illustrated in 16-page Catalog 2204, of Brown Instrument Co., Wayne and Roberts Ave., Philadelphia, Pa.

Cycle Controllers—Impulse-sequence cycle controllers for the control of plant processes are described in 4-page illustrated Bulletin No. 575 of Bristol Co., Waterbury, Conn.

Instrument Charts—A 32-page illustrated catalog covering a complete line of recording instrument charts has been issued as Catalog No. 1230 by C. J. Tagliabue Mfg. Co., Park and Nostrand Ave., Brooklyn, N. Y.

Liquid Level Instruments—How water level is read and recorded from a remote point, using the Metameter, is described in a reprint article by Reginald Trautschold entitled "Telemeter Water Level Record," distributed by the Bristol Co., Waterbury, Conn.

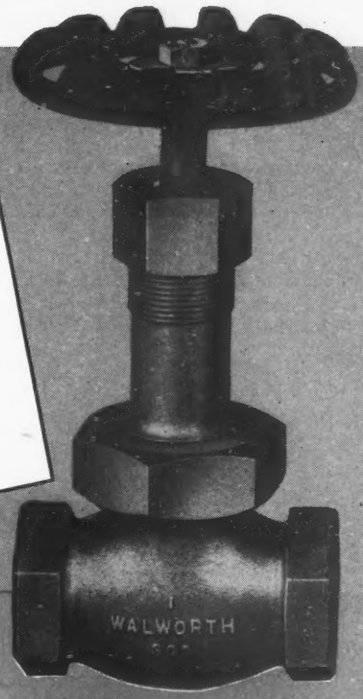
15 MINUTES RE-GRINDING...NOW!

MAY DOUBLE THE USEFUL LIFE OF THAT VALVE

Today, more than ever before, it is important to get the longest possible life from every valve. Walworth is publishing this simplified method of re-grinding in the hope that it will enable customers to prolong the useful life of their valves. It is important that your valves be re-ground as soon as a leak, however small, is discovered.

Continued use without attention may result in a cut so deep that it cannot be removed by grinding. Walworth Re-grinding Valves are designed to be re-ground without removing the body from the pipeline.

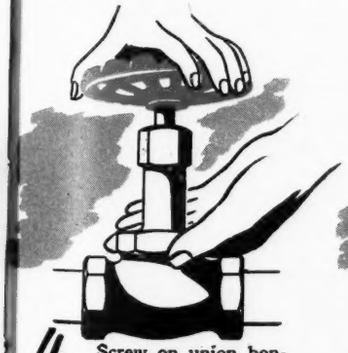
Before taking the valve apart, empty the pipeline. This may be done by closing the next valve on the upstream side. Unscrew the union bonnet ring and lift the bonnet assembly.



1 Place a pin or nail through the hole in the lower portion of the stem. This hole will be discovered by revolving the disc until the slot in the disc locknut is directly over the hole. With this pin in place the disc and stem are locked together.

2 Apply grinding compound to disc and seat with finger. It is recommended that a grinding compound with an emery base be used.

3 Place bonnet assembly in the body. Hold the bonnet and revolve the hand wheel until the disc touches the seat and until the bonnet is raised about 1/32 inch from the body.



4 Screw on union bonnet ring to hand tightness and then back off about one turn. Oscillate the hand wheel with one hand, meanwhile holding the union bonnet ring firmly to keep it from turning.

5 After pitted surfaces are ground smooth, wipe seat and disc with a cloth that has been dipped in gasoline—be sure all grinding compound is removed from the parts.

6 IMPORTANT! Remove pin from hole in shaft before reassembling valve.

WALWORTH 1842 1942 VALVES AND FITTINGS 100TH ANNIVERSARY

THIS IS OUR CENTENNIAL YEAR

This year marks the 100th Anniversary of the founding of our company, and we had a nice series of "institutional" ads in mind to tell you about it. We hope you saw the first one, which appeared in the January trade publications. Needless to say, that ad was prepared before December 7, 1941, and things have happened since then.

Advertising is conceded to be the most economical means of telling a message to the greatest number of people, and in this period of Priority Production we feel that it is the duty of Walworth advertising to cooperate in a national program of Salvage, Simplification, Specification, and Substitution.

So we've scrapped the "institutional" ads we had planned for our centennial year, and present a series of ads which we think will help valve and fitting users get more service from their existing Walworth material and thereby permit the output of our five plants to be used to the best advantage for Victory in the great national effort.

WALWORTH

VALVES FITTINGS and TOOLS
Backed by 100 Years' Service

WALWORTH COMPANY
60 EAST 42nd STREET, NEW YORK

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

BOOKS

How to Sun-dry Fruits

METHODS AND EQUIPMENT FOR THE SUN-DRYING OF FRUITS. Circular 350. By E. M. Mrak and J. D. Long. Published by University of California Agricultural Experiment Station, Berkeley, Calif. 1941. 69 pages; 6x9¼ in.; paper. Free.

Published to supersede an earlier circular on the subject, now out of print, this pamphlet constitutes a practical treatise for anyone concerned with drying fruits in the sun. After discussing the degree of maturity best for fruits to be sun-dried, the authors take up washing and the removal of spray residue and preparation for drying. Then follows a 34-page section on the equipment required for handling, washing, cutting, pitting, drying, sulphuring, storage, fumigation and packing. Some 23 pages are devoted to information on methods of preparation and drying, followed by discussions of farm-scale packing, storage and treatment, and routine analyses of dried fruits.

Illustrations aid the reader in understanding the equipment and methods described.

Formulas for Bakers

BREAD ROLLS AND COFFEE CAKE. Published by Worcester Salt Co., 40 Worth St., New York, N. Y. 1941. 16 pages; 5¼x8 in.; paper. Free.

Nineteen commercial formulas for different types of bread, six formulas for rolls and five for coffee cakes are contained in this booklet, along with brief discussions of the action of salt in baking and trouble shooting in the bake shop.

The formulas include lists of ingredients and processing directions.

Sugar Analysis Handbook

PHYSICAL AND CHEMICAL METHODS OF SUGAR ANALYSIS. By C. A. Browne and F. W. Zerban. Published by John Wiley & Sons, Inc., 440 4th Ave., New York, N. Y. 1941. 1,353 pages; 6¼x9¼ in.; cloth. Price, $15.

Here is a practical and descriptive treatise for use in research, technical and control laboratories. It is a revision of the "Handbook of Sugar Analysis," out of print for ten years. The work is scientific and thorough in its treatment of the subject, and it devotes space to the measurement of electrical conductivity, pH, surface tension, color, turbidity and determination of impurities.

The following are the chapters of the book: Sampling of Sugar and Sugar Products; Determination of Moisture in Sugars and Sugar Products by Methods of Drying; Densimetric Methods of Analysis; Principles and Uses of Refractometers; Polarized Light, Theory and Description of Polarimeters; Theory and Description of Saccharimeters; Polariscope Accessories; Specific Rotation of Sugars; Methods of Simple Polarization; Methods of Invert or Double Polarization; Special Methods of Saccharimetry; Miscellaneous Physical Methods as Applied to the Examination of Sugars and Sugar Solutions; Qualitative Methods for the Identification of Sugars; Reduction Methods for Determining Sugars; Special Quantitative Methods; Combined Methods and the Analysis of Sugar Mixtures; Selected Methods for Miscellaneous Carbohydrate Products.

Labeling Canned Foods

CANNED FOOD LABELS THAT MEET CONSUMER NEEDS. Published by National Canners Association, Washington, D. C. 33 pages; 6x 9in.; paper. Free.

Within the covers of this booklet are contained a brief resume of the Federal labeling law and regulations, a summary of the principles of grade and descriptive labeling, and discussion of both methods. A well-designed descriptive label is illustrated.

Two tables give the factors selected and the relative value assigned to each factor in the establishment of grades for the 43 canned and frozen vegetables for which Agricultural Marketing Service grades now exist.

Levulinic Acid Data

LEVULINIC ACID. Published by A. E. Staley Manufacturing Co., Research Development Division, Decatur, Ill., 1941. 38 pages; 6x9 in.; paper.

Preceded by two temporary mimeographed bibliographies, this logically arranged and easily read compilation of literature references pertaining to levulinic acid can rightfully be evaluated as a tedious, exhaustive job well done.

Levulinic acid has become a commercial commodity during the past few years. Its uses in food manufacture are being gradually recognized and developed. For the research worker and technological investigator looking for new ingredient materials to replace or alternate with those becoming scarce because of increased demand or war time complications, this handy aid to published knowledge on levulinic acid is a timely one. It treats of levulinic acid from its preparation to its industrial applications.

PATENTS

Chewing Tablets Made to Have Gum Center With Plurality of Hard Candy Coatings Containing Insoluble Alkali Medicament—Kenneth A. Bartlett, Essex Falls, and William J. Schultz, West Orange, N. J., to White Laboratories, Inc., Newark, N. J. No. 2,262,087. Nov. 11, 1941.

Bread Dough Mixed in Atmosphere of Controlled Oxygen Content and in Presence of Vitamin C to Give Desired Proteolytic Enzyme Activity—Charles N. Frey, Scarsdale, Jacob Freilich, New York, and Herbert C. Gore, Scarsdale, N. Y., to Standard Brands, Inc., New York, N. Y. No. 2,262,138. Nov. 11, 1941.

Sausages Cured by Coating With Wax and Maintaining at Drying Temperatures—August Kellerman, to Industrial Patents Corp., Chicago, Ill. No. 2,262,238. Nov. 11, 1941.

Fat-containing Foods Packaged to Permit Inspection While Protecting Contents Against Rancidity Development — John Seneca Cummings, Brooklyn, N. Y., to Interchemical Corp., New York, N. Y. No. 2,262,270. Nov. 11, 1941.

Soya Protein Treated to Impart Thermoplastic Properties—George H. Brother, Urbana, and Leonard L. McKinney, Champaign, Ill., to Secretary of Agriculture of the United States of America. No. 2,262,422. Nov. 11, 1941.

Confections Deposited Upon Endless Conveyor Surface Which Moves in Cyclic Relation to Mechanical Action of Depositor—Jesse W. Greer, to J. W. Greer Co., Cambridge, Mass. No. 2,262,640. Nov. 11, 1941.

Confections Formed for Freezing by Use of Powder-like and Freezable Molding Material Capable of Taking and Holding Desired Imprints for Size and Shape of Confections—George Waid, Springfield, Vt., one-half to A. Linton Bausman, Springfield, Mass. No. 2,262,729. Nov. 11, 1941.

Vitamin B_1 Synthesized by Yeast Action Upon 2-Methyl-5-Ethoxy Methyl-6-Amino Pyrimidine and 4-Methyl-5-Beta Hydroxy Ethyl Thiazole—Alfred S. Schultz and Lawrence Atkin, Bronx, and Charles N. Frey, Scarsdale, N. Y., to Standard Brands, Inc., New York, N. Y. No. 2,262,735. Nov. 11, 1941.

Food in Containers Given Heat Treatment While Passing Through Retort Unit in Continuous Manner Along Circular Path and With Rotation—Pierre Carvallo, Amposta, Spain. No. 2,262,921. Nov. 18, 1941.

Ergosterol Vaporized and Activated Into Vitamin D in Continuous Manner Under High Vacuum—Charles G. Ferrari and Lester F. Borchardt, to General Mills, Inc., Minneapolis, Minn. Nos. 2,262,995 and 2,262,996. Nov. 18, 1941.

Sauerkraut Used as Ingredient in Baked Wafer Made to Contain Sugar, Salt, Cream, Melted Lard and Dry Flour Constituents—Harold A. Guetzkow, St. Paul, Minn. No. 2,263,000. Nov. 18, 1941.

Rollable Fruits Mechanically Washed While Passing Through Troughs Formed by Rotating Rolls and Stationary Supports Which Impart Rubbing Action Upon Fruits—Thomas G. Cunning, Upland, Calif. No. 2,263,030. Nov. 18, 1941.

Fats, Margarine and Like Chilled by Feeding Onto Refrigerated Surface in Pre-Determined Path and Removed From Refrigerated

Surface in Continuous Manner — Charles Doering, one-half to Henry Doering, Chicago, Ill. No. 2,263,072. Nov. 18, 1941.

Packaged Food Quick Frozen in Thermostatically Controlled Machine—James O. Harvey, one-half to Earl L. Mohr, Sioux City, Iowa. No. 2,263,241. Nov. 18, 1941.

Foods Immersed in Liquid Refrigerant Frozen During Passage Through Cooling Zone Which Converts Refrigerant Into Slush; Product and Slush Separated With Recirculation of Refrigerant Slush to Meet Incoming Unfrozen Foods—Clarence Birdseye, Gloucester, Mass., to Mechanical Research, Inc., Providence, R. I. No. 2,263,452. Nov. 18, 1941.

Frozen Confections Stabilized Through Addition of Finely Divided Coating of Seeds of Plantago Family—Lewis A. Baumann, Chevy Chase, Md., to Permagel Co., Washington, D. C. No. 2,263,483. Nov. 18, 1941.

Leavening Agent Made to Consist of Sodium Bicarbonate and Particles of Monocalcium Phosphate Coated With More Than 10 Percent of Calcium Acid Pyrophosphate—Edwin Cox and Robert H. Kean, to Virginia-Carolina Chemical Corp., Richmond, Va. No. 2,263,487. Nov. 18, 1941.

Doughnuts and Crullers Formed by Dividing Blank Sheets of Dough—Roy S. Fox, to Edw. Fox Baking Co., Inc., York, Pa. No. 2,263,490. Nov. 18, 1941.

Vitamin E and Antioxidant Concentrate Made From Wheat Germ Oil—John S. Andrews, St. Paul, Minn., to General Mills, Inc. No. 2,263,550. Nov. 18, 1941.

Shrimps Deveined and Removed From Shells by Mechanical Means—Ralph V. Grayson, Houston, Tex., to Kroger Grocery & Baking Co., Cincinnati, Ohio. Nos. 2,263,694; 2,263,695; 2,263,696; and 2,263,697. Nov. 25, 1941.

Sugar Crystallized From Solution Moving in Continuous Stream — Johannes Anthonius Platte and Gerbertus Hendrik de Vries, Madioen, Java, Dutch East Indies. No. 2,263,704. Nov. 25, 1941.

Butter Made From Warm Cream in Continuous Mechanical Operation — Joseph O'Connell and Harold Kerr, Macauley Road, Kensington, Victoria, Australia. No. 2,263,851. Nov. 25, 1941.

Meat Slit by Rotary Knives Adjustable for Cutting to Different Depths—Joseph P. Spang, Quincy, Mass., to Cube Steak Machine Co., Inc., Boston, Mass. No. 2,263,854 and 2,263,855. Nov. 25, 1941.

Sausages Slit by Mechanical Means—Vincent L. Bundschu, Louisville, Ky. No. 2,263,869. Nov. 25, 1941.

Canadian Patents

Butter Shaped and Embossed in Machine Having Device for Slicing and Means for Wrapping Individual Embossed Pats Cut From Slices—Benjamin Rottenberg, New York, N. Y. No. 400,379. Nov. 4, 1941.

NCl_3 Prepared for Use as Flour Improver by Electrolyzing Acidified NH_4Cl Solution in Which NH_4 Ion Concentration is Lowered by Adding Metal Chloride—Gerrit van der Lee, to Naamlooze Vennootschap Industrieele Maatschappij voorheen Noury en van der Lande, Deventer, Holland. No. 400,542. Nov. 4, 1941.

NCl_3 Prepared for Use as Flour Improver by Electrolyzing NH_4Cl Solution While Allowing Part of Produced NCl_3 to Hydrolyze in Solution for Maintenance of Requisite Acidity and Sweeping Out Remainder of Produced NCl_3 in Gas Current—Erich Staudt, to Naamlooze Vennootschap Industrieele Maatschappij voorheen Noury en van der Lande, Deventer, Holland. No. 400,543. Nov. 4, 1941.

Beer Cooled in Tube Coil Encased in Perforated Metal Casing Surrounded by Container Filled With Ice and Water, Ends of Coil Being Extended Axially at Top and Bottom to Provide Beer Inlet and Outlet—Max Nagin, New York, N. Y. No. 400,778. Nov. 18, 1941.

Ice Cream Produced by Continuous Method in Freezing Cylinder Under Pressure, Gas Being Continuously Passed Into Cylinder in Controlled Quantity While Mixing is Effected by Scraper and Beater—Chas. F. Weinrich, Desplaines, Ill., and A. L. Voggenthaler, Cedar Rapids, Ia., to Cherry-Burrell Corp., Chicago, Ill. No. 400,825. Nov. 18, 1941.

Dehydrating Vegetables

(*Continued from page 43*)

relative humidity one pound of dry air contains about 0.57 lb. of moisture, whereas at 130 deg. F. and 90 percent relative humidity it contains only about 0.095 lb. of moisture.

Relative humidities are determined by means of two thermometers, one having a dry bulb and the other a bulb covered by a silk or muslin gauze kept moist by distilled water. Instrument companies supply such combinations at low cost.

Nichols and associates [17] recommend that the relative humidity at the dehydrator outlet should not greatly exceed 65 percent, or 25 percent at the hot end, in order to secure rapid and proper drying. It may be necessary, however, to maintain a lower humidity when drying red peppers in order to secure a red rather than dark color in the finished product.

Case Hardening

In the dehydration of blanched potatoes (sweet or white) and peas, the surface may case harden, i.e., sear over owing to the inability of moisture to come to the surface as rapidly as it is evaporated. And subsequent dehydration is greatly impeded by the dense surface layer. Other vegetables show very little of this tendency.

While case hardening is retarded by increasing the relative humidity of the air by recirculation or by admitting steam, tests with prunes showed that the decreased rate of drying caused by the increased humidity was greater than the decrease caused by case hardening. In other words, case hardening was the lesser of the two evils.

In the drying of vegetables the incoming air should be of low humidity to attain the maximum drying rate.

Moisture Content

Vegetables must be dried to a much lower moisture content than fruits if they are to keep satisfactorily, owing to the fact that they have a much lower ratio of water-soluble solids to the insoluble solids. The starch in the vegetables does not dissolve in the vegetable juice, whereas the sugar of fruits does dissolve. Consequently, on drying, the juice in the fruit becomes highly concentrated in sugar content, which prevents growth of yeasts, molds and bacteria. The juice of vegetables is thin and low in sugar and other solubles. So it must be concentrated to very small volume in order that the resulting sirup will have sufficient preservative power to prevent spoilage by microorganisms.

Also, if the moisture content of the dried product is above a certain minimum, nonbacterial deterioration will be rapid. This is especially true of unblanched vegetables.

Gore and Mangels [18] found that the following dehydrated vegetables retained their quality well if they contained not more than the following amounts of moisture: Carrots, 7.39 percent; turnips, 5 percent; onions, 6.64 percent; spinach, 5.38 percent; cabbage, 3.34 percent.

The moisture content of most dried vegetables should be less than 6 percent. At and below this moisture content they are "bone dry," and if they are protected from insects and moisture uptake they usually will keep in good condition for more than a year.

Judging Finishing Point

With a little experience the operator can judge when the vegetables are sufficiently dry. They should be brittle and show no moistness in the interior when cut or broken. Stems of spinach and chard should be brittle, not leathery. Potatoes should break "with a snap" when bent between the fingers. Peas should be "hard dry" all the way through.

In general, sufficiently dried vegetables will be "bone dry."

It is essential, however, to determine moisture content occasionally on all varieties after drying, in order that the operator's judgment may be checked. For moisture determination a representative sample, obtained by mixing small amounts from each of several trays, is ground fine in a kitchen-size food grinder, mixed and immediately sealed in a bone-dry fruit jar to avoid moisture uptake from the air. The sample may then be sent to a commercial chemist for analysis. Or if the dehydrating plant has a chemist, he may determine the moisture content by the xylene distillation method or by drying in a laboratory oven at 100 deg. C. (212 deg. F.) or in a vacuum oven at 70 deg. C. and 28 to 29 in. of vacuum. The last named procedure is more accurate.

It is likely that the electrical-conductivity moisture tester in common use for dried fruits could be applied to vegetables. However, it would be necessary to make a great many measurements with it against the vacuum-oven method to calibrate it for each vegetable. Information concerning moisture determination and the dried fruit moisture tester can be obtained from books on food analyses [19,20] and the patent description of the moisture tester.[21]

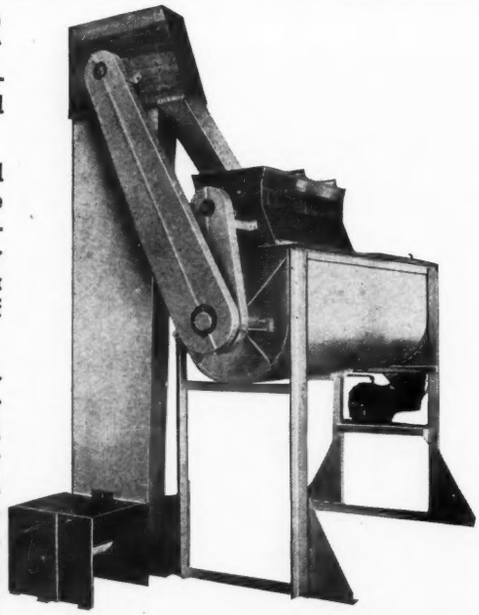
(*Part III will appear next month*)

FOOD AND THE WAR

The Army travels on its stomach — and so does the civil population.

Preservation of our crops and other food resources at once becomes an economic necessity. We must feed, not only our own nationals but also a large percentage of those of our Allies.

ROBINSON UNIQUE PROCESSING EQUIPMENT for grinding, sifting, mixing and handling operations is readily adapted to many specialized requirements, and our Engineers and Designers are available for co-operation with Production Executives while planning installations to efficiently solve their problems. Your inquiry will receive prompt attention.



Sifter and Mixer with hopper on floor. Mounted on high frame for discharge into shipping containers or handling receptacles.

ROBINSON MFG. COMPANY
71 PAINTER STREET MUNCY, PA.

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20. A. G. Woodman, "Food Analysis," 4th Edition. McGraw-Hill Book Co., 330 W. 42nd St., New York, N. Y.
21. C. D. Fisher, Apparatus for Determining Moisture Content of Dried Fruits, Etc., by Electrical Conductivity, U. S. Patent No. 1,961,965, 1934.

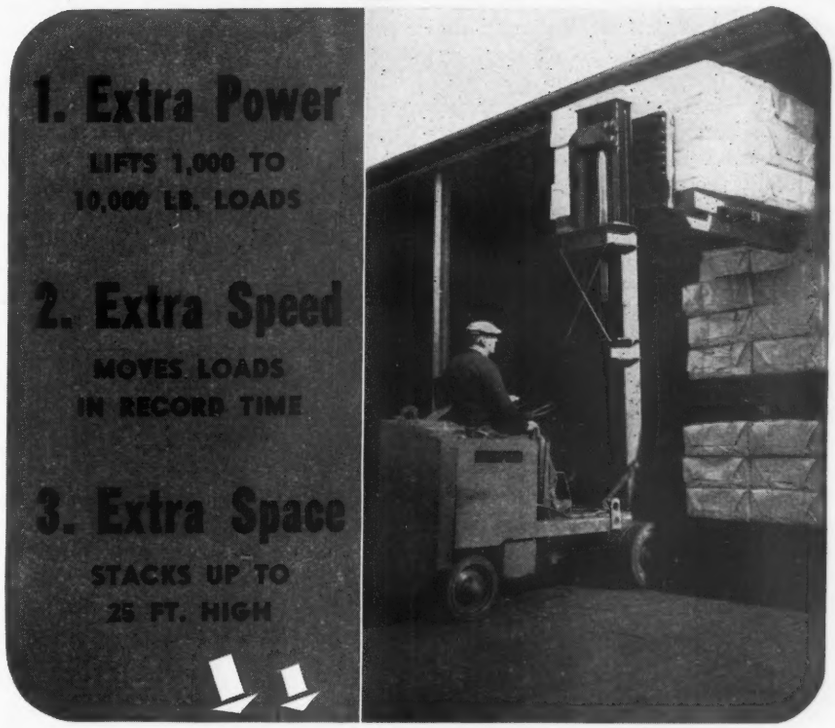
AMS Standards

(Continued from page 56)

by discoloration, sunburn, hail marks, scab, disease, insect injury or other means; not more than 5 percent are slabs; not more than 3 percent are immature; not more than 3 percent are affected by mold, imbedded dirt or other foreign material; and not more than 1 percent are affected by decay or insect infestation. The total of all defective halves, within the limits prescribed above, does not exceed 10 percent by weight.

U. S. GRADE B dried apricots are dried apricots of similar varietal characteristics; are fairly thick meated; and possess a fairly uniform color. The predominating color is a reasonable good color, characteristic of dried, properly matured fruit. Not more than 10 percent by weight of the halves of dried apricots are damaged by discoloration, sunburn, hail marks, scab, disease, insect injury or other means; not more than 7 percent are slabs; not more than

3-Way Action



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6 percent are immature; not more than 4 percent are affected by mold, imbedded dirt or other foreign material; and not more than 1 percent are affected by decay or insect infestation. The total of all defective halves, within the limits prescribed above, does not exceed 15 percent by weight.

U. S. GRADE C dried apricots are dried apricots of similar varietal characteristics and the predominating color is a fairly good color characteristic of dried, properly matured fruit. Not more than 15 percent by weight of the halves of dried apricots are damaged by discoloration, sunburn, hail marks, scab, disease, insect injury or other means; not more than 10 percent are slabs; not more than 10 percent are immature; not more than 5 percent are affected by mold, imbedded dirt or other foreign material; and not more than 1 percent are affected by decay or insect infestation. The total of all defective halves, within the limits prescribed above, does not exceed 20 percent by weight.

U. S. GRADE D (slabs) dried apricots consist of dried apricots which exceed the tolerance for slabs but meet all other requirements of U. S. GRADE C.

"Properly matured" means apricots which, when harvested, have reached a state or development that will insure the proper completion of the ripening process. "Diameter" means the longest measurement otainable across the face of the half. "Damage by discoloration" means halves that have become darkened to such an extent as to make them conspicuous when compared with other halves in the lot meeting color requirements. "Damage by sunburn" means any substantial damage to color or texture of skin caused by excessive heat during the growth of the fruit. "Damage by hail marks, scab or disease" means that the combined areas of all such defects or of any one such defect exceed in the aggregate an area equivalent to the area of a circle $\frac{3}{8}$ in. in diameter. "Damage by insect injury" means insect injury penetrating the flesh or affecting the appearance of the fruit. "Damage by other means" means any defect or group of defects not mentioned herein, which singly or in combination materially affects the appearance, edibility or keeping quality of the fruit.

"Slabs" means halves that have been mashed, broken or mutilated to the extent that they have lost their contour and have become definitely flattened at the edge or rim. A half with a slightly torn edge resulting from pulling apart of the halves of an apricot not completely severed by the cutter shall not be considered a slab. "Insect infestation" means the apricots are infested with live insects, insect remains or excreta. "Immature halves" means halves that are green or of a color indicative of immature fruit.

ISSUED: April 22, 1941.
EFFECTIVE: May 1, 1941.

Vitamin A Butter Content

(*Continued from page 49*)

may be of little value in estimating their vitamin A potencies.

Although considerable amounts of carotene and vitamin A are stored in the tissues of cows when they are receiving rations containing an abundance of carotene, this storage is not sufficient to insure the continued production of summer quality butter during periods when poor roughages are fed. When cows are placed upon a low carotene diet, the vitamin A potency of the butterfat declines rapidly for about two weeks. After reaching a point where the carotene and vitamin A appearing in the butterfat are drawn largely from the tissue reserves of the animal, any further decline will be slow and gradual, depending on the rate of depletion of the body storage. Conversely, the vitamin A potency of the fat may be restored as rapidly as it declined when the cow is given the proper ration. Thus it becomes apparent that the production of butter of high potency is dependent entirely upon the vitamin A value of the rations fed to the cow.

High-Vitamin Feed Required

For the production of milk and butter of maximum vitamin A value, it has been found at this station that cows require a daily intake of not less than 550,000 vitamin A units when the source of vitamin A is carotene of alfalfa hay. When vitamin A *per se* from fish oils instead of carotene from feeds is the source of vitamin A, this requirement is satisfied with an intake of approximately 200,000 units. These results indicate that, unit for unit, vitamin A *per se* is approximately three times as effective as carotene.

This requirement is high and in the usual feeding practices can be met only by feeding grasses, hays and silages of high carotene content. With rations containing properly cured alfalfa, clover, early cut soybean hay, or silages, the vitamin A potency of butter may be practically equal to that produced on pasturage. However, when straw, timothy hay or poor grades of alfalfa and clover hay are fed, this requirement cannot be met and, consequently, butter of

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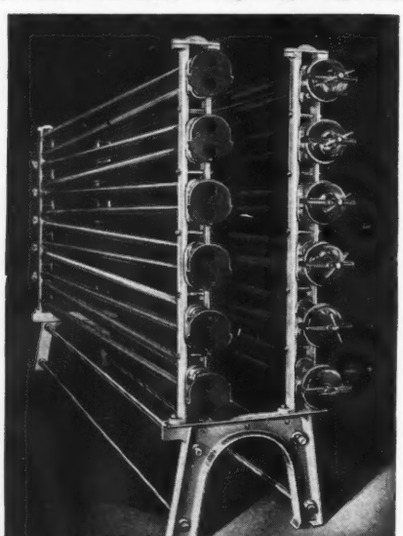

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an inferior vitamin quality is produced.

Effect of Soybeans

The grains of the rations usually have little effect upon the vitamin A potency of butterfat. However, if soybeans or soybean oil meal are introduced into the grain mixture of the ration, the vitamin A potency of the butterfat may be reduced materially even though the carotene intake is satisfactory. This effect is due to some substance in soybeans which interferes with the transference of the vitamin A potency of the ration to the milk. However, with rations containing large amounts of carotene, butter of high potency may be produced even though soybeans are used as protein supplements in the grain ration.

The dairy man's approach to the problem of controlling the vitamin A content of milk and cream from which butter is made is primarily a problem of proper nutrition of the cow. In order to insure the production of milk of uniformly high vitamin A potency throughout the year, he must feed his cows rations containing an abundance of carotene derived either from fresh green forage crops or from roughages from these crops in which the carotene has been properly preserved.

Butter Manufacturer's Part

The butter manufacturer's part of the control program begins where the forward-looking dairyman's part leaves off. His responsibility in the control of the vitamin A potency of butter is primarily that of preservation of the inherent vitamin A value of the dairy products. After obtaining a source of supply of milk or cream, he is faced with the problem of processing, storage and distribution of butter in such a manner as to avoid loss or decomposition of the vitamin A and carotene content.

Fortunately, there is no reason why the vitamin A should be destroyed in the proper processing of milk, cream or butter. However, carotene and vitamin A are susceptible to oxidation. Oxidation may be retarded by proper refrigeration and avoidance of undue exposure to air. Butters which have been processed from wholesome cream may be stored at low temperatures for some time without any discernible loss of vitamin A potency.

It should be remembered that the public, today as never before, is paying more attention to the nutritive qualities of milk and milk products. The butter manufacturer should endeavor to give to the consuming public products of highest nutritive value by exercising care in all details of processing, and by encouraging the dairyman to supply high quality milk and cream which have been produced through proper nutrition of his herd.

Photo Courtesy of Alloy Fabricators, Inc., Newark, N. J.

. . . Because these tanks are made from Jessop SILVER-PLY Stainless-Clad Steel*

The battery of tanks shown in the illustration are for the transportation of bulk grain products. No severe corrosive conditions are encountered, yet the owner wanted to prevent any chance of contamination so he used stainless equipment. At the same time, he wanted to hold down material costs. The natural solution to his problem—and the one he used successfully—was to have his tanks made from Jessop SILVER-PLY Stainless-Clad Steel. The stainless steel cladding on the inside provides the same protection as solid stainless while the mild steel backing reduces the material costs.

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* Produced under U. S. Pat. Nos. 1,997,538 and 2,044,742

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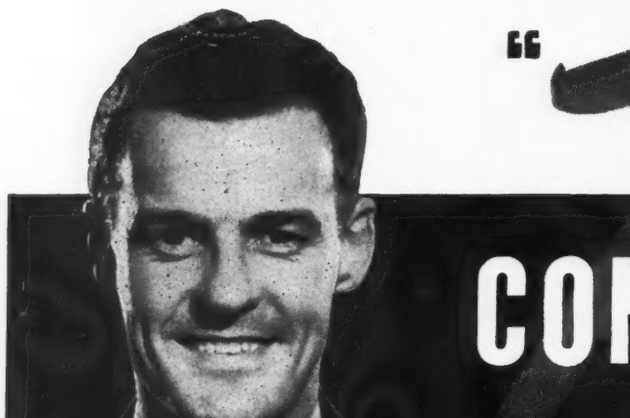

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FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

ENGINEERING

Spray Pasteurizer

ACCORDING to U. S. Patent 2,249,036 (granted to Norman J. Peters, Fond du Lac, Wis., on July 15, 1941), a pasteurizer has been invented that has, as one of its main features, the ability to bring the pasteurizing temperature of milk up very quickly with a low-temperature heating medium so as not to affect the flavor. The agitation is such as to pass the milk over the heating surface as quickly as possible without affecting the cream line and without whipping the milk. The method used for bringing the milk up to pasteurizing temperature involves spraying heated water against the side and bottom of the milk container. When the circulation of this water stops, the direct heating stops, so that there is substantially no heat added to the milk while it is being held at a pasteurizing temperature, and hence overheating and consequent caramelization of the milk is prevented.

While this apparatus has been primarily designed for milk, it may also be used for treating or making chocolate mix, buttermilk, cream, ice cream mix and similar products. The apparatus is so constructed that its parts may be easily kept in sanitary condition. It can also be used as a cooler by circulating cold water through it.

Vegetable and Fruit Skin-removing Device

THIS APPARATUS relates to a skin-removing device for treating vegetables and fruits to remove the skins or similar protective coatings. This is performed after the skins have been loosened while being subjected to the shock of heat. The apparatus is also adaptable for removing the skins of fruits and vegetables which have been loosened by other processes.

After the charred or blistered skins have been removed from the fruits or vegetables, they are washed away by a system of sprays that is so situated or constructed that no particular portion of the fruits or vegetables is washed too long. Also, the spray action suddenly cools the fruits and vegetables to prevent further cooking. The apparatus is so designed that the skins are removed not only by friction between the fruits and vegetables and driven rolls but also by friction between the fruits and vegetables themselves.

Digest taken from U. S. Patent 2,249,787 (granted to Bailie N. Savage, Seattle, Wash., on July 22, 1941).

DAIRY PRODUCTS

Distribution of Salt In Butter

IN SPITE of the retarding action of salt on the growth of bacteria, salted butter sometimes spoils because of bacterial action. To ascertain whether uneven distribution of salt might be responsible, localized bacterial growth was permitted in low salt zones, and a micro technic was developed and applied to the determination of salt content in extremely small samples of butter picked from different zones in an ordinary sample. Salt and moisture were determined in the same micro samples. In general, the survey showed that bacteria were most active in poorly worked unsalted butter and least active in butter containing evenly distributed salt. It is true that some samples of putrid commercial butter contained evenly distributed salt, indicating that other factors are involved, but the analytical results definitely show faulty salt distribution to be a factor in bacterial spoilage. Some samples of putrid commercial butter had their salt very irregularly distributed, and experimental samples showed that uneven distribution weakens the potency of salt as an inhibitor of bacterial spoilage.

Digest from "Distribution of Salt in Butter and its Effect on Bacterial Action," by Wesley H. Hoecker, *Iowa State College Journal of Science*, Vol. 16, 75, 1941.

Rheology in Cheesemaking

RHEOLOGY, the science of flow and deformation of matter, has a place both in the theory and practice of cheesemaking. For example, in making some cheeses such as cheddar, a critical factor is correct judging of consistency when the diced curd is heated and stirred. If the curd is allowed to settle when too soft, or heated till too firm, the quality of the cheese suffers. Rheological testing at this point requires measurement of shape retention in a molded curd cylinder and of whey separation as indicated by surface density. Both these tests are made at once, in less than a minute, in the Blair-Coppen test (*Journal of Dairy Research* 11, 187, 1941).

For testing finished cheese an instrument has been designed which gives remarkably straight log s/log t curves (s = shearing strain; t = time) with test cylinders of cheese, butter, bread, cake, apple, potato and other products. The instrument is a simple and accurate device for measuring, rather than estimating, the body of such products in testing for quality.

Digest from "Rheology Applied to Cheesemaking," by G. W. Scott Blair, *Chemistry and Industry*, Vol. 60, 447, 1941.

FISH

Chemistry and Salt Fish

SOME MOLDS and bacteria are naturally halophilic, i.e., capable of growth on concentrated brines, while others adapt themselves to a salt environment. More than 30 strains of halophilic bacteria are known. Their cultures are pink or red and their enzymes are proteolytic. These properties explain the pink or red color and the strong odor of infected salt fish. Halophilic bacteria are inhibited by acids and by sodium benzoate. But a halophilic mold called "dunn" is favored by acid. Hence a buffered system containing 2 lb. of sodium benzoate and 30 lb. of phosphate buffer to 1,000 lb. salt is best, but the cost of such a mixture is an obstacle.

Bacteria present in the fish before it is salted have enzymes which liberate trimethylamine from the trimethylamine oxide in fish muscle. To make salting effective, the penetration must be sufficient to carry at least 8 percent sodium chloride to the deepest layer of flesh in 2 to 5 days. Most of the loss in producing salt fish occurs in dry-

ing. The extreme cases are salt incrustation when drying is too slow and case hardening when drying is too fast. The best practical method is to alternate fast and slow drying.

Digest from "Chemistry and the Salt Fish Industry," by D. B. Finn, *Canadian Chemistry*, Vol. 25, 175, 1941 (Published in Canada).

Determining Freshness Of Fish

TESTS HAVE BEEN conducted to determine whether the change in refractivity (light-bending property) of the juice or "drip" that exudes from stored halibut flesh has any relation to the freshness of the flesh.

Test results indicate that there is no definite relationship between refractive index of the juice and time of storage of the fish from which the juice was taken. The refractometer readings fluctuated from day to day in a most erratic manner. The fluctuations are assumed to be due to varying amounts of protein in the juice. The protein in the juice could not be controlled by the methods used, and in many instances the juice contained more protein, especially after deterioration of the flesh had advanced. Also, there was no apparent relationship between the rate of freezing and thawing of the fish slices and the refractive index of the drip or juice collected from them.

Digest from "Light-Bending Properties of Drip from Stored Halibut," by E. P. Sidaway, *Progress Reports of Pacific Biological Station and Pacific Fisheries Experimental Station*. No. 49, pp. 3-5, 1941 (Published in British Columbia).

VITAMINS

Concentration of Vitamin A By Adsorption

VITAMIN A is a nutritional factor whose necessity in the human diet is becoming increasingly evident to the general public. Utilization of the phenomenon of adsorption (the attraction that a solid surface may exert on the components of a solution in contact with it) is one possible means for producing it. Attention should be drawn to earlier experiments showing the loss of vitamin A occurring because of adsorption on the soaps formed during the alkali refining of a fish oil. This same force of adsorption has been used in various laboratories to concentrate vitamin A from fish oil unsaponifiable matter. This is the material remaining after the fatty constituents (triglycerides) of the oil have been removed by conversion to soap.

Experiments have been performed to determine the feasibility of using this force of adsorption to concentrate vitamin A from fish oils where it occurs in small concentrations. If adsorption could be successfully applied, it would be possible to recover the vitamin from the oil in a more or less pure form and then use the oil in the same industrial processes as before.

The experiments have dealt with the more readily studied unsaponifiable matter and have consisted of a survey of chemicals to determine which showed adsorbent properties for vitamin A. Seventy-one materials have been examined in powdered form directly as obtained, without any attempt at drying or other preparatory treatment which might modify their force of adsorption. Of these, ten showed promise of being usable.

The materials that showed signs of adsorbing vitamin A are calcined alumina, calcium hydroxide, tribasic calcium phosphate, infusorial earth, basic magnesium carbonate, salicic acid, sodium benzoate, sodium sulphate, sodium sulphite and powdered sugar.

Digest from "The Concentration of Vitamin A by Adsorption," by L. A. Swain, *Progress Reports of Pacific Biological Station and Pacific Fisheries Experimental Station*. No. 49, pp. 13-16, 1941 (Published in British Columbia).

MEAT

Color of Canadian Bacon

EXACT COLOR MEASUREMENTS of smoked and unsmoked bacons have been made with a photoelectric comparator for comparison of Canadian and Danish bacons. It has been shown in previous studies that color is related to certain aspects of curing, postcuring treatments and chemical composition of bacon. Comparisons have now shown that color stability is about the same in Canadian and Danish bacons. Data obtained with the photoelectric comparator were compared with estimates by expert judges, since the objective data given by the comparator offer no information concerning consumer preferences in color. From the comparisons it appears that a bacon would be rated good in color if its total scatter value in the photoelectric comparator is from 58 to 74 percent as compared to a white standard, with scatter values of 30 to 36 percent in the red, 16 to 21 percent in the green and 13 to 17 percent in the blue. Scatter values were somewhat lower for unsmoked than for smoked bacons. Decisions of judges concerning

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the colors to be rated as desirable are necessarily somewhat arbitrary, but they provide a basis for further study.

Digest from "Canadian Wiltshire Bacon. XXI. Objective Color Comparisons of Canadian and Danish Bacons and Their Relation to Subjective Observations of Color Quality," by C. A. Winkler, G. Abel and W. H. Cook, *Canadian Journal of Research*, Vol. 19D, 225, 1941; also issued as Paper No. 66, Canadian Committee on Storage and Transport of Food, and as NRC No. 1001 of the National Research Council, Ottawa.

BEVERAGES

Conversion Factors Used In Brewery Calculations

IN BREWERY CALCULATIONS it is sometimes necessary to change quantities from the metric to the English system, or vice versa; or to change results of analyses to the brewer's system of measurement. These changes require mathematical calculations which may be longer and more involved than time will permit. A number of conversion factors are listed below:

From	Multiply by
Grains per gallon to parts per million	17.118
Parts per million to grains per gallon	0.0584
Grains per gallon to ounces per barrel	0.0720
Parts per million to ounces per barrel	0.0042
Parts per million to pounds per million gallons	8.345
Grains per gallon to pounds per million gallons	142.86
Barrels to gallons	31.5
Barrels to hectoliters	1.192
Hectoliters to barrels	0.8387
Gallons to barrels	0.0318
Gallons to hectoliters	0.0379
Hectoliters to gallons	26.4178
Fluid ounces to liters	0.0296
Liters to fluid ounces	33.814
Pints to liters	0.4732
Liters to pints	2.1134
Quarts to liters	0.946
Liters to quarts	1.0567
Barrels to cubic feet	4.212
Cubic feet to barrels	0.2374
Gallons to cubic feet	0.1337
Cubic feet to gallons	7.481

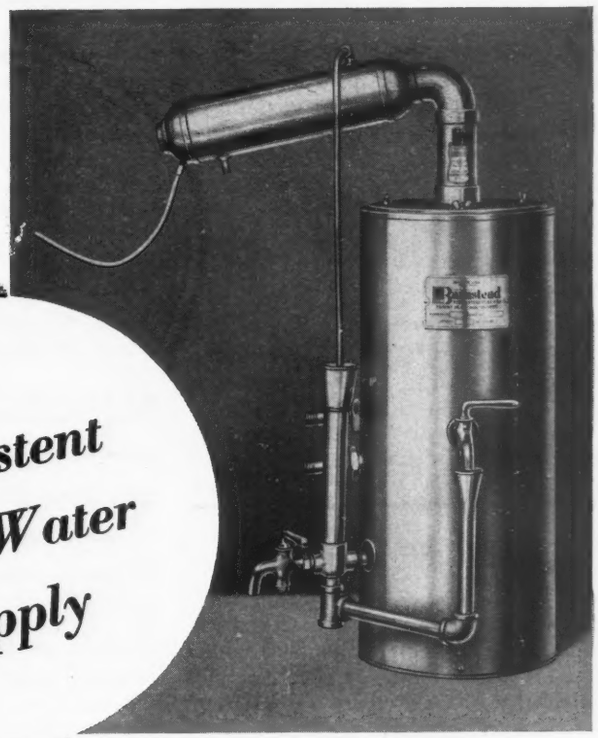
Digest from "Conversion Factors Commonly Used in Brewery Calculations," by A. R. Couse, *Bulletin No. 10*, Wahl-Henius Institute, Chicago, Ill., page 12.

Processing Apple Juice

IN TESTS with apples raised commercially in Canada, two varieties excel particularly in juice quality. Golden Russet gives the best juice of any single variety, while McIntosh gives an excellent unblended juice and has exceptionally full body for blending with other juices. Tolman Sweet and Wealthy apples give inferior juice if used alone, but can be used to excellent advantage in blends.

Pectin-reducing enzymes such as "Pectinol" or "Filtragol" (obtained from *Penicillium* mold cultures) offer a simple and convenient fining agent for pressed juice (25 oz. of enzyme to 100 gal. of juice) but the effect is not as thorough as when gelatin and tannic acid are used for clarification. The

For Control Laboratories



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Consolidated Flour Mills Co., Hutchinson, Kan.
Continental Baking Companies
Corn Products Refining Co., Undercliff, N. J.
Diamond Salt Co., St. Clair, Mich.
Hawaiian Agricultural Co., Punaluer, T. H.
Hawaiian Sugar Planters Assn., Honolulu, T. H.
Hecker H-O Co., Inc., Buffalo
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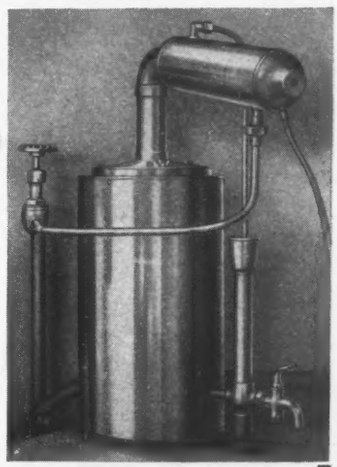

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enzyme treated juice is likely to form a light sediment after a few months' storage in bottles or cans. Flash pasteurization is preferable over other methods, being less likely to give the juice a cooked flavor. Much of the natural vitamin C content is lost in pasteurization. Apples may be selected for vitamin C, Baldwin and Spy being best among common varieties grown in Canada. Ben Davis, Winesap, Golden Russet, Gravenstein and King are also good, but Golden Delicious, Delicious, Tolman Sweet and McIntosh are poor in vitamin C.

Digest from "Fruit Juice Processing," by R. J. Hilton, *Canadian Chemistry and Process Industries*, Vol. 25, 364, 1941 (Published in Ontario).

SUGAR

Removing Impurities Of Sugar Solutions

SUGAR SOLUTIONS contain colloidal impurities which must be removed before the solids are allowed to crystallize out. The usual procedure is to add lime and calcium acid phosphate to form a floccy precipitate which sweeps away the undesired particles. The process is not entirely satisfactory in that the precipitate is of such a nature that it tends to clog the filter presses, and further it does not decolorize the solution.

A newly invented process overcomes these difficulties by the use of a colloidal gel made by combining trisodium phosphate, aluminum sulphate, calcium chloride and sodium silicate. The gel, after washing to free it of soluble salts, is added in small amounts to the sugar solution and flocs out so rapidly that in half an hour the liquors are ready for the filters. Pale straw-colored, crystal clear, solutions result.

Digest from *Silicate P's & Q's*, Vol. 21, No. 9, Sept. 1941. (Philadelphia Quartz Co.)

MISCELLANEOUS

Sulphur Dioxide Used To Preserve Grapes

IN THE COLD STORAGE of vinifera grapes, some microorganisms, notably *Botrytis sp.*, make sufficient growth in a month or more at 32 deg. F. to cause serious amount of rot, calling for a supplemental treatment to control the microorganisms.

Sulphur dioxide has been found an effective aid in the storage of California-grown grapes. Several other treatments have been applied to grapes, especially in South African districts where sulphur dioxide fumigation has not been acceptable because of excessive injury to their varieties. Some of these treatments have shown considerable promise. Some other treatments include treatment with ortho-phenyl phenol, formalin spray, ethyl alcohol dip, sodium bisulphite pellets, ethylene oxide fumigation, ammonium carbonate pellets and methyl bromide fumigation.

The sulphur dioxide treatment consisted of fumigating the grapes for 20 minutes with a concentration of about 1 percent by volume at 70 deg. F. This treatment was similar to the usual applications to commercial shipments of grapes in California. As soon as the fruit was fumigated, the bunches of grapes were wrapped, packed and stored.

After the experiments had been completed, the percent of decayed grapes after ten weeks storage at 32 deg. F. showed only 3.7 percent when sulphur dioxide fumigation was used.

Digest from "A Comparison of the Fungicidal Treatments for the Control of Botrytis Rot of Grapes in Storage," by W. T. Pentzer and W. R. Barger, *Proceedings of the American Society for Horticultural Science*, Vol. 39, 281-284, 1941.

Sterile Air Through Aerosols

THE DISCOVERY of germicidal mists or aerosols offers new possibilities for air sterilization in food plants. Liquid aerosols consist of droplets, approximately 1-2 Angstroms in diameter which are dispersed in the air. Because each droplet contains the same concentration of the effective chemical as the parent solution, the bactericidal agent can act in high concentrations on bacteria suspended in the air, whereas the actual amount of the compound in the atmosphere may be of the order of one part per many million volumes of air.

Although resorcinol and hexyl resorcinol which were found effective as aerosols are harmless to animal bodies in the concentrations employed, these substances possess a certain degree of toxicity.

Propylene glycol, trimethylene glycol and ethylene glycol are extremely low in their toxic effect. However, 1 part of propylene glycol in 2 million volumes of air effected complete sterilization of an atmosphere containing as many as 200,000 bacteria per cubic liter of air. Ethylene and trimethylene glycol are about equally effective. Glycerine, on the other hand, exhibits only slight germicidal action.

Digest from "Sterilization of Air by Certain Glycols Employed as Aerosols," by O. H. Robertson, E. Bigg, B. F. Miller and Q. Baker, *Science*, Vol. 93, 213, 1941.

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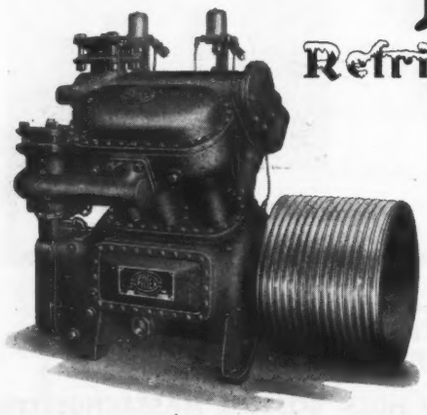

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FORMULAS FOR FOODS

FORMULA NO. 271

Game Paste

(Suitable for Sandwich Spread)

Lean venison	60 lb.
Fat	16 lb.
Rice flour	10 lb.
Salt	1 lb.
Cayenne	1 oz.
Nutmeg	1 oz.
Bone stock	1 gal.
Lemon juice	20 fl. oz.
Sherry wine	20 fl. oz.

Directions

Bone the raw meat after hanging a few days. Place bones in a steam-pan and cover with water; add a little salt and simmer for 8 to 10 hours. Strain off liquor from bones and allow to stand overnight; by next day it should have set to a jelly; if not, return to pan and boil further or fortify with gelatine. Roast the meat (both lean and fat), adding beef fat if there is insufficient deer fat. After roasting, allow to become cold. Chop the meat and fat and pass through mincing machine. Then transfer to mixing machine; add the remaining ingredients and mix well. Reduce mixture to a smooth paste; then fill into containers, cap and sterilize at 240 deg. F. for a time depending on the size of the container.

For reduction to paste, a mincing machine, edge-runner or colloid mill may be used.

Formula from H. B. Cronshaw, London, England. Republication rights reserved.

FORMULA NO. 272

Cut Marshmallow

(To be coated)

Granulated sugar	54 lb.
Corn sirup	46 lb.
Standardized invert sugar	12 lb.
High-grade gelatine	3¾ lb.
Water	24 lb.

Mixing Directions

Dissolve the gelatine in the water, then add the sugar and standardized invert sugar and stir until they are dissolved. When this is done the temperature of the batch should register a temperature of approximately 175 deg. F. Shut off the heat, then add the corn sirup and stir through the batch. Beat until one American gallon measure filled with this marshmallow weighs 3¾ to 4 lb. net. Add color and flavor as wanted. Spread into trays that have been lined with ordinary wrapping paper. Leave the trays in a room of normal temperature until the marshmallow has set. This will take from five to ten hours. When firm enough the marshmallow can be dumped out of the trays, the paper moistened and removed and the marshmallow cut into pieces of the desired size. After cutting allow the pieces to dry sufficiently, then coat with chocolate.

Formula from Nulomoline Co.

FORMULA NO. 273

Crullers

Fat (butter, lard or lard substitute)	10 oz.
Sugar	1¼ lb.
Eggs	1 lb.
Flavoring extract	½ oz.
Flour	5 lb.
Baking powder	2½ oz.
Water	1¼ pt.
Fat (for deep frying)	8 lb.

Mixing Directions

Cream butter and sugar together and add the extract. Beat the eggs well, then beat into the creamed mixture. Sift the baking powder and flour together and add to the mixture. Add the water, and stir until the dough is smooth. Roll out the dough to a thickness of ½ in. and cut with a doughnut cutter. Fry a golden brown in deep fat. Remove, drain, and roll in granulated sugar, or place on a plate and dust with powdered sugar.

Formula from Quartermaster General, U. S. Army. Training Manual No. 2100-152.

FORMULA NO. 274

Banana Oatmeal Cookies

Sugar (white or brown)	20 lb.
Shortening	7 lb. 8 oz.
Salt	7½ oz.
Soda	10 oz.
Cinnamon	1 oz.
Nutmeg (optional)	1 oz.
Rolled oats	15 lb.
Fine-ground raisins	5 lb.
Ripe bananas	15 lb.
Egg whites (or whole eggs)	3 lb. 2 oz.
Vanilla	5 oz.
Ammonia	1 oz.
Water (to dissolve ammonia)	1 lb.
Pastry flour	15 lb.
Granulated sugar	2 lb. 8 oz.

Mixing Directions

Place the sugar, shortening, salt, soda, cinnamon, nutmeg, rolled oats and raisins in a cake machine. Mix thoroughly to break up raisins and oatmeal and to prevent drag on wire cutter of machine. Add the ripe bananas slowly and continue to mix until bananas are broken up thoroughly and mixture is smooth. Use only full-ripe bananas—yellow peel well flecked with brown. Add eggs, vanilla, ammonia and water while creaming. Add the flour and granulated sugar and mix only enough to incorporate. Ammonia is not necessary and is only used for additional spread. To replace ammonia, use slightly more soda.

Make plain or with topping, or brush with milk, water or beaten egg. For top cookies, turn pan of drop cookies over in crushed nuts or nut siftings to cover each cookie completely with the nut topping. For one dozen regular size cookies, use 11- to 12-oz. mixture. Bake at 385 to 400 deg. F.

Formula from Fruit Dispatch Co.

FORMULA NO. 275

Indian Meal Bread

Rye flour	5 lb.
Corn meal	7 lb. 8 oz.
Graham flour	7 lb. 8 oz.
Bread flour	5 lb.
Cream of tartar	1¼ oz.
Milk (variable)	30 lb.
Soda	5 oz.
Colloidal sugar	5 lb.
Salt	12½ oz.
Molasses (high grade)	7 lb. 8 oz.

Mixing Directions

Mix rye flour, corn meal, graham flour, bread flour and cream of tartar together. Add the solution of milk, soda, sugar and salt, adding the molasses last. Dough should be slack. Steam in steamers in regular brown bread moulds from two to three hours.

Formula from White-Stokes Co., Inc.

FORMULA NO. 276

Lady Fingers

Sugar (fine granulated)	2 lb.
Egg yolk	4 oz.
Whole eggs	2 lb.
Salt	1 oz.
Vanilla extract	½ oz.
Cake flour	2 lb. 4 oz.

Mixing Directions

Place sugar, egg yolks, whole eggs and salt in container and warm to about 100 deg. F. in hot water bath. Stir thoroughly to dissolve sugar and salt. Use high speed. Whip until

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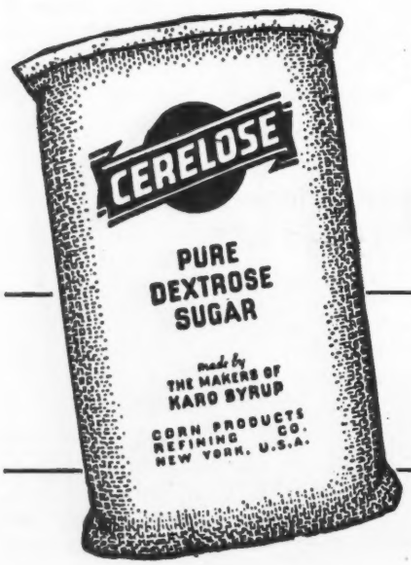

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light and fluffy. Add vanilla extract and previously sifted flour. Bag the batter at once. Drop from a No. 5 plain tube onto a paper-lined bun pan. Keep the size small. This should make from 18 to 20 dozen double pieces.

Baking Directions

Dust lady fingers lightly with 4X sugar. Pick up corners of paper and shake off excess sugar. Bake quickly on sheet pan in oven at 450 deg. F. with flashy top heat. Care should be taken to not over bake and then cool quickly.

Formula from General Foods Sales Co., Inc.

FORMULA NO. 277

Jelly Roll Sponge Cake

Eggs	12 lb.
Yolks	4 lb.
Fruit-powdered sugar	32 lb.
Salt	10 oz.
Invert sugar	4 lb.
Lemon extract	4 oz.
Liquid milk	18 lb.
Top-quality special cake flour	28 lb.
Baking powder	1 lb. 2 oz.

Mixing Directions

Warm the eggs and yolks to 90 deg. F. Whip the eggs, yolks, salt and 14 lb. of sugar together on second speed until fairly stiff (15 to 20 minutes). Dissolve the remaining amount of powdered sugar, invert sugar and lemon extract in the milk and warm to 100 deg. F. Add to the egg mixture with a few turns on low speed. Blend the cake flour and baking powder by sifting. Fold in or mix in on low speed.

Deposit on greased and floured sheet pans. Bake quickly at 400 to 415 deg. F. (small oven); 400 to 450 deg. F. (large, loaded oven). Turn out immediately on paper sprinkled with sugar. Roll either hot or cold. May be baked as deep layers in greased and floured pans, for use as split shortcakes.

Formulas from Brown's Hungarian Corp.

FORMULA NO. 278

Cup or Loaf Cake Icing

Icing sugar	25 lb.
Shortening	2½ lb.
Dry milk solids	1 lb.
Water	5 lb.
Stabilizer	1 oz.

Place 15 lb. of icing sugar, shortening and dry milk solids in mixing bowl and mix until shortening is broken up. Heat water to boiling. Incorporate stabilizer in water. Methods used will depend upon kind used. If agar, sift into boiling water and boil for two minutes. Add the remaining icing sugar (10 lb.) to the boiling stabilized water and completely dissolve. Slowly pour the hot stabilized water-sugar preparation into the sugar-milk solids-shortening mixture and mix at low speed. Mix until smooth and apply immediately.

Formula presented by C. W. Lantz at annual meeting of American Society of Bakery Engineers, Chicago, March 14, 1940.

FORMULA NO. 279

Prepared Sweet Dough

Sugar	40 lb.
Salt	2 lb. 8 oz.
California lemon oil	0.5 oz.
Mace	5 oz.
Turmeric	2 oz.
Cardamom, fine ground	0.25 oz.
Concentrated butter flavor	1 oz.
Emulsifying type shortening	30 lb.
Milk powder (blend well)	10 lb.
Baking cream	2 lb.
Soy flour	2 lb.
Bread flour	216 lb.

Mix ingredients together and put aside for use.

Formula from Parker-Broeg.

FORMULA NO. 280

Basic Sweet Dough

Water	3 lb.
Whole eggs	8 oz.
Yeast	8 oz.
Basic Sweet Dough Mixture (See Formula No. 279)	9 lb.

Mixing Directions

Place the water in machine bowl and then add eggs, yeast and dough mixture. Mix smooth and have dough at 80 deg. F. Let lighten to approximately ½ to ¾ rise (usually 30 minutes). Then shape into strips or pieces and proof. Dough is then ready for final make-up into sweet goods, jelly doughnuts or yeast raised doughnuts.

Formula from Parker-Broeg.

FORMULA NO. 281

Marshmallow Filler

Sugar XXXX	4 lb.
Glucose	1 lb.
Egg whites	½ pt.
Invert sirup	4 lb.
Vanilla (or any other flavors)	
Gelatine (220 Bloom), high test	2¾ oz.
Water	1 pt.
Salt	⅛ oz.

Soak gelatine in the water for one hour and then heat to 180 deg. F. Place in the mixing bowl with the other ingredients and beat for 5 minutes at medium speed. Change to high speed and beat until stiff. Add flavor to taste.

Formula presented by C. W. Lantz at annual meeting of American Society of Bakery Engineers, Chicago, March 14, 1940.

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